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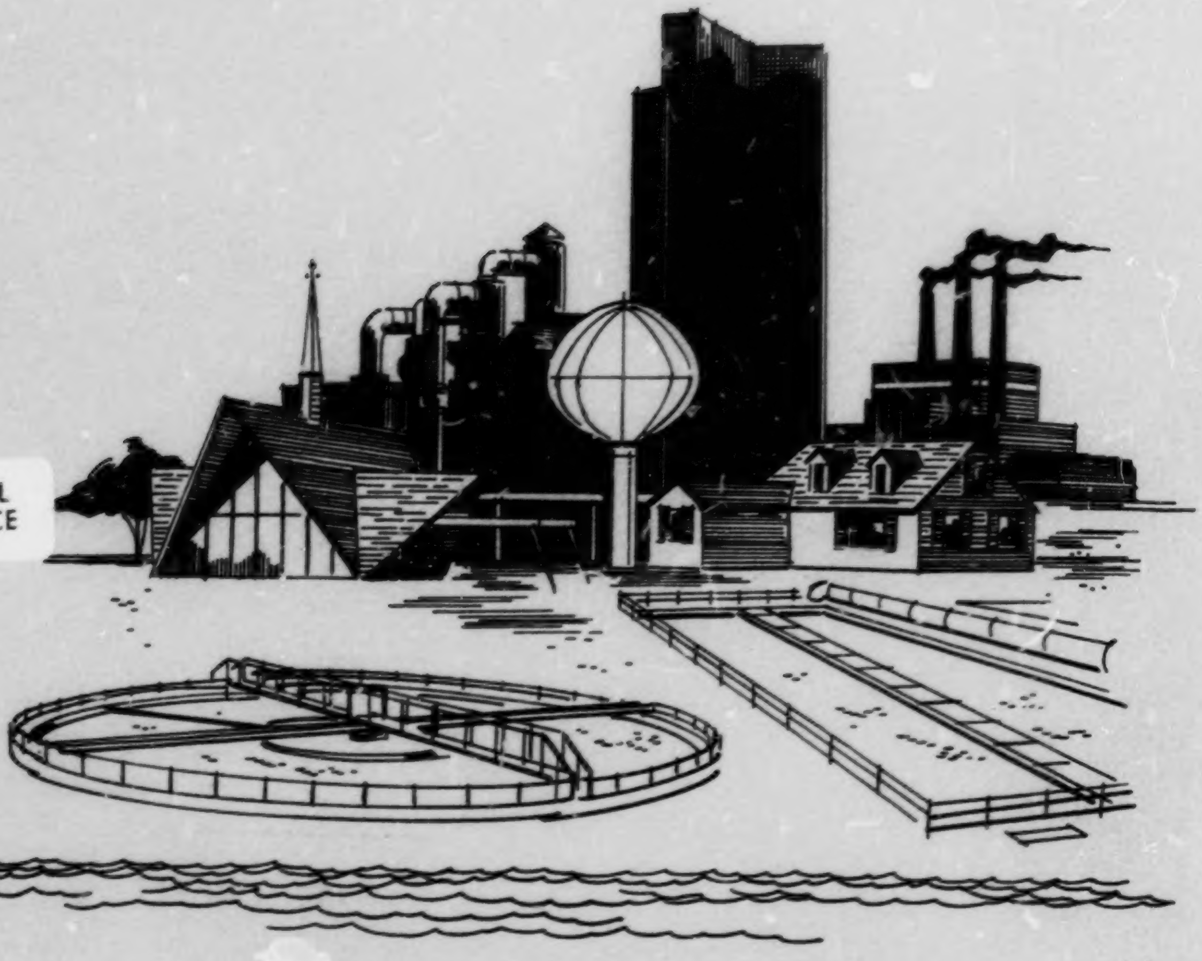

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27 Abstract

A feasibility study to determine the practicality of joint treatment of municipal and industrial wastewater was initiated in Onondaga County, New York. The 24 industries include in both the Ley Creek and the Metropolitan Sanitary districts were contacted as to their production of wastewaters and their effluents samples as needed. Bench scale studies were then used to determine the feasibility of the various activated sludge systems. A sampling and analysis program was conducted to determine the characteristics of the wastewater influents to both plants, with the results indicating that although toxicity was a potential problem it was causing no problems at present. Therefore, the primary pollutant to be removed was organic material. Total organic loads at both the Ley Creek and the Municiapl Plant were equal, but flow to the Municipal Sewage Treatment Plant was nearly three times as great as the flow to Ley Creek. The Municipal Sewage Treatment Plant was chosen as the outfall because of greater dilution capacity of Onondaga Lake. Activated sludge treatment of the primary effluent of both plants was shown to be feasible, with the Ley Creek Sewage treatment plant destined for eventual phasing-out. Cost estimates for different system configurations (conventional activated sludge, contact stabilization, etc.) ranged from $23,000-$30,000 for capital cost and $3,700-$4,400/year for operation and maintenance. The full-scale joint treatment operation was forecast to be able to obtain in excess of 85% BOD removal during winter operation. (Lowry-Texas)

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FEASIBILITY OF JOINT TREATMENT IN A LAKE WATERSHED

"FEASIBILITY OF JOINT MUNICIPAL AND INDUSTRIAL
WASTEWATER TREATMENT IN THE ONONDAGA LAKE
WATERSHED, ONONDAGA COUNTY, NEW YORK"

FEDERAL WATER POLLUTION CONTROL ADMINISTRATION
DEPARTMENT OF THE INTERIOR

BY

ROY F. WESTON, INC.
WEST CHESTER, PENNA.

PROGRAM NO. 11060 FAE
GRANT NO. WPRD 66-01-68

NOVEMBER, 1969

FWPCA Review Notice

This report has been reviewed by the Federal Water Pollution Control Administration and approved for publication. Approval does not signify that the contents necessarily reflect the views and policies of the Federal Water Pollution Control Administration, nor does mention of trade names or commercial products constitute endorsement or recommendation for use.

ABSTRACT

Onondaga County, New York undertook a feasibility study of joint treatment of municipal and industrial wastewaters. Industries were contacted to assess their wastewater situation, and major wastewater contributors were sampled. Influent wastewaters to the two major sewage treatment plants were also sampled. With practically all industry connected to the municipal systems and within the constraint of a pump station and force main to transfer wastewater from the Ley Creek to the Metropolitan Sewage Plant, the number of feasible treatment alternatives was reduced. Bench-scale activated sludge studies were conducted on the feasible alternatives.

The initial plant interviews showed that practically all industries in the watershed were connected to the municipal sewer system, with one of them contributing approximately 60 percent of the organic load on the Ley Creek Plant. While metals concentrations, from various metal-plating shops, were high at different times, the concentrations measured in the Ley Creek Plant influent were generally acceptable for biological treatment. Total organic loads at the Ley Creek and Metropolitan Sewage Plants were about equal; flow at the latter plant was approximately three times as great. Raw, pretreated, or secondary-treated wastewater from the Ley Creek Plant was shown to be amenable to combination with raw Metropolitan Sewage Plant influent for secondary treatment. A full-scale joint treatment plant should obtain BOD removals of more than 85 percent during winter operation.

This report was submitted in fulfillment of Grant No. WPRD 66-01-68 between the Federal Water Pollution Control Administration and Onondaga County Department of Public Works.

Key Words:

Activated Sludge - Contact Stabilization - Cost Analysis - Industrial Wastes - Joint Systems - Lake Watershed - Municipal Wastes - Process Design - Sampling Survey - Waste Treatment.

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CONCLUSIONS AND RECOMMENDATIONS

Conclusions

Conclusions regarding the wastewater situation at individual industries have been presented in the appropriate company sections of the Appendix of the Interim Report, *Industrial Discharges in the Ley Creek Sanitary District*, dated March 1, 1969. The conclusions presented herein relate to the overall project and are based on the industrial interviews, wastewater sampling and analysis programs, laboratory treatability study, process design investigations, preliminary cost estimates, and related discussions.

1. Of the 139 industries initially contacted, 113 are within the Ley Creek Sanitary District. Twenty-four of these 113 industries were discharging wastewaters (including clean cooling water) to Ley Creek.
2. Of the twenty-four industries discharging to the creek, only two (Crouse-Hinds Co. and Syracuse China Corp.) showed a need for installation of treatment facilities. The remaining industries either discharged acceptable effluents or could produce acceptable effluent by the in-plant changes recommended in the Interim Report.
3. A number of industries discharge significant concentrations of metals and cyanides to the Ley Creek Sewerage System. Because dilution in the overall wastewater flow generally lowers the concentrations of metals and cyanides to tolerable levels, these discharges normally will not adversely affect biological treatment. Nevertheless, the potential for such interference exists.
4. 80 - 90 percent of the industrial organic pollution discharged to the Ley Creek Sewerage System comes from the Bristol Laboratories plant. This same source contributed 50 - 60 percent of the total organic load of the Ley Creek Sewage Treatment Plant.
5. The existing Ley Creek Collection system is adequate in geographical coverage for all currently recommended additions of industrial wastewater.
6. The biological treatability studies indicated the following selections of activated sludge process modifications for various wastewater combinations:

Wastewater	Process Modification
Ley Creek S.T.P. Influent (1-A)	Conventional
LCSTP Secondary Effluent and Metropolitan Influent (1-B)	Contact-Stabilization
LCSTP and MSTP Influents (2)	Conventional
LCSTP Plain Aeration Effluent and MSTP Influent (3-B)	Contact-Stabilization

7. Removal of suspended solids (through primary clarification) from the combined raw wastewater of the Ley Creek and Metropolitan Sewage Treatment Plants should change the indicated treatment for this alternative from conventional activated sludge to contact-stabilization.

8. Within the frame of reference of the constraints imposed, treatment required, and total annual costs involved, contact-stabilization treatment of the combined raw Ley Creek and Metropolitan S.T.P. influent wastewaters is preferable to any of the other treatment alternatives.

9. The total capital cost for this selected treatment system is estimated to be $26,109,000; the total annual cost is estimated to be $3,455,000.

10. Pretreatment by industry to reduce its BOD loading to the acceptable level (300 mg/L) would not significantly reduce the total annual costs of the proposed municipal treatment system.

Recommendations

1. Accept the discharge of Crouse-Hinds wastewater into the Ley Creek sewerage system after satisfactory pretreatment for removal of oil, solids, and dissolved metals.

2. Permit Syracuse China Corporation to discharge suitably clarified wastewater to Ley Creek.

3. Implement the wastewater management recommendations for individual industries outlined in the Interim Report.

4. Initiate a program requiring industries discharging potentially toxic materials or high concentrations of organics or other undesirable materials to begin a wastewater sampling and analysis program.

5. Monitor industrial wastewater discharges, to protect the collection and treatment system.

6. Implement the design and construction of a contact-stabilization treatment plant for the combined Ley Creek S.T.P. and Metropolitan S.T.P. influent wastewaters, to be located at the site of the present Metropolitan plant.

INTRODUCTION

General Background

Onondaga Lake and its watershed are located in Onondaga County, New York and are a part of the larger Oswego River Basin Drainage Area. The southern portion of the lake lies within the City of Syracuse, with the larger northern area of the lake being located in the towns of Salina and Geddes. Onondaga Lake is about 4.5 miles long and about a mile across at its widest point. The most suitable uses of the waters of the southern end of Onondaga Lake are for agriculture and process cooling.

A number of studies have been made on Onondaga Lake and its watershed over the years. These studies have indicated that the major problems affecting Onondaga Lake are the result of: municipal plant effluents entering the lake and its tributaries, industrial wastewater discharges in the watershed, stormwater overflows from the various interceptor sewers, and the existing organic deposits in the lake. In addition, the lake has a high natural background level of chlorides.

There are two sanitary districts for the collection and treatment of wastewaters around the lower end of Onondaga Lake: Ley Creek Sanitary District and Metropolitan Sanitary District. The locations of these districts and their treatment plants are shown on Drawing B-1. The Ley Creek Sanitary District covers approximately the drainage area of Ley Creek, one of the major tributaries of Onondaga Lake. This Sanitary District lies generally to the north and east of the City of Syracuse and includes the Village of East Syracuse, a small section of the City of Syracuse, several highly concentrated industrial sites, and a large area of undeveloped land; the major concentration of industries in and around the City of Syracuse is within the Ley Creek Sanitary District. The initial Ley Creek Sewage Treatment Plant (S.T.P.), located approximately one mile upstream of the outlet of Ley Creek to Onondaga Lake, was designed as a standard-rate activated sludge plant for a population of 30,000 and an average flow of 4.5 MGD. These facilities were placed into operation early in 1940, and in less than five years the plant was overloaded, primarily because of unexpected industrial development. Duplicate facilities were designed and put into operation in March of 1951. Since that time, the flow and organic load on the treatment plant have increased to such an extent that the plant is again overloaded. Effluent from the treatment plant has been discharged into Ley Creek near the plant. The waters of this creek have been classified as acceptable for agricultural use and industrial water supply, but unacceptable for fishing, bathing, or drinking water supply.

Following World War 1, a primary-treatment plant was constructed in the general vicinity of the present Metropolitan Plant on the southern tip of Onondaga Lake. This plant became overloaded, and in September 1960 the present intermediate treatment system (chemical flocculation in a primary-treatment system) was put into operation. Effluent from this treatment plant is discharged to the southern tip of Onondaga Lake. Two large industrial complexes in the Metropolitan Sanitary District discharge industrial wastewaters directly to Onondaga Lake.

Onondaga County, in the early stages of its overall program to improve the quality of Ley Creek and Onondaga Lake, conducted pilot plant operations at the Ley Creek Sewage Treatment Plant utilizing a plastic-media trickling filter alone and also followed by activated sludge. The results of these studies were reported to be successful, but the effluent was still unacceptable to Onondaga County for year-round discharge to Ley Creek. Subsequently, the County's consultants investigated the feasibility of pumping this treated wastewater to Onondaga Lake or to the Seneca River, with the former indicated as the more economical. With the construction of a lake outfall as the indicated solution, it then became an attractive alternative to transfer the Ley Creek Treatment Plant effluent to the Metropolitan Treatment Plant. This would permit utilization of the Ley Creek Treatment Plant as the first step in a two-step treatment system, with partial or pretreatment at the Ley Creek Treatment Plant to reduce organic shock loads or mitigate possible toxicity factors and with final treatment at the Metropolitan Treatment Plant.

The two major industries in the Metropolitan Drainage Area (Solvay Process Division of Allied Chemical Company and Crucible Steel Company), although not directly involved in the current study, are a definite factor in Onondaga County's overall study. The County has been working with Solvay Process on a combined treatment system which in effect will reduce the contamination in Solvay's wastewater and provide tertiary treatment (phosphate removal) for the municipal wastewater. The site tentatively selected for this treatment facility is at the Metropolitan Sewage Treatment Plant. This proposed tertiary treatment facility will not be considered a part of this report except as its location may affect the location of the proposed biological treatment system. Crucible Steel is also working with Onondaga County on the solution of its wastewater problems.

Disposal of digested sludge from the present Metropolitan Sewage Treatment Plant is to the Solvay Process waste beds. Although ultimate sludge disposal was not considered a part of this study, it is anticipated that the present method of disposal will be used in the expanded plant, and therefore, would have an effect upon treatment plant location.

Scope and Objectives

Onondaga County, in an attempt to reduce the pollution load on Onondaga Lake and its tributaries and in anticipation of stricter treatment requirements, had initiated a number of programs leading to an upgrading of treatment facilities. As part of this program, Onondaga County in December 1966 applied to the Federal Water Pollution Control Administration for a research and development grant to demonstrate the feasibility and practicality of joint municipal-industrial wastewater treatment in the Onondaga Lake Watershed. Subsequently, FWPCA Grant No. WPRD 66-01-68 was awarded.

Onondaga County retained ROY F. WESTON early in 1968 for two phases of the Onondaga Lake Watershed Study: 1) to determine the present state of industrial discharges within the Ley Creek Drainage Area; and 2) subsequently to develop a Master Plan of wastewater collection and treatment for this area. The scope of work as outlined in Onondaga County - ROY F. WESTON Contract No. P-112 of 13 February 1968 - includes the following:

1. Determination of the sources, quantities, and characteristics of the wastewater through sampling and analysis of the wastewaters of all industries in the Ley Creek Sanitary District with significant discharges.

2. Evaluation of operating practices at these industrial plants (including inspection of wastewater treatment facilities) to provide recommendations relative to: reduction of wastewater discharges by in-plant changes, segregation of clean wastewaters not requiring treatment; reduction of total water usage, recovery of waste constituents or by-products, as applicable; improvement of on-site waste control programs, and need for on-site pretreatment of wastewaters.

3. Sampling survey of the influent to the Ley Creek S.T.P. for comparison with the total industrial wastewater discharged to the Ley Creek system. Data from this survey was included in an interim report to Onondaga County dated 1 March 1969.

4. Laboratory-scale treatability and related studies of the wastewater generated in the Ley Creek Drainage Area and of wastewater from selected industrial plants to determine design parameters. These studies were to cover: physical/chemical treatment, biological treatability, determination of quantities and characteristics of the sludges produced, and the effects of combining various wastewaters.

5. Preparation of a Master Plan for wastewater collection, including alternative methods of collecting industrial wastewater separately from sanitary wastewaters.

6. Development of a process design based on the results of the treatability studies and the wastewater collection Master Plan, including plot plan, process flow sheet, and schedule of estimated capital and operating costs for the recommended treatment alternative.

7. Preparation of a report covering discussion of the treatment alternatives the recommended solutions, and the supporting reasons. This report was intended to include recommendations for improving water pollution control practices for individual industries whenever appropriate.

Treatment of Ley Creek wastewaters (raw or pretreated) in conjunction with the influent to the Metropolitan Treatment Plant became a real possibility with the construction of a pumping station and force main to transfer all wastewaters to the Metropolitan Treatment Plant. The original scope of the treatability studies was thus expanded to include the Metropolitan wastewater.

3

PROBLEM DEFINITION

Wastewater Sources, Quantities and Characteristics

General Basis of Data

The wastewater survey of the Ley Creek Drainage Area basically consisted of two phases: industrial interviews, and a sampling and analysis program. In preparation for the industrial interviews, a list of 139 industries either served by the Ley Creek Sewerage System or within the drainage area of Ley Creek was obtained from Onondaga County. This list was based on information provided in *Directory of Manufacturers and Products - 1965* prepared by the Manufacturers Association of Syracuse.

Each industry was asked to cooperate in the wastewater survey and was notified of the type of information which would be requested in the interview. Subsequently, the industries were visited, the production facilities toured, and wastewater handling facilities inspected. At the conclusion of each preliminary visit, a file memorandum was prepared describing the wastewater problem and indicating the need for sampling and analysis. The industrial plants visited were sent letters expressing appreciation for their cooperation and informing them of future sampling and analysis plans.

Prior to the inception of the industrial sampling and analysis program, a random grab sampling survey of the Ley Creek Sewage Treatment Plant influent was conducted to obtain an estimate of the magnitude of the problem and to prepare baseline figures for use in determining the significance of individual industrial wastewater discharges. Forty-two random grab samples were collected during the period 6/13/68 through 6/20/68 and were analyzed in the engineer's laboratories in Syracuse, New York, for 5-day and Ultimate Carbonaceous Biochemical Oxygen Demand (BOD_5, BOD_{uc}), Chemical Oxygen Demand (COD), suspended solids (SS), volatile suspended solids (VSS), pH, and alkalinity or acidity. A portion of each of these samples was appropriately preserved, shipped to the ROY F. WESTON laboratory in West Chester, Pennsylvania, and analyzed for phenol, oil and grease, cyanide (CN), chromium (Cr), copper (Cu), nickel (Ni), cadmium (Cd), zinc (Zn), ammonia (NH_3), total organic nitrogen (TON), orthophosphate (O-PO_4), and total phosphate (T-PO_4). Flow measurements were recorded from the influent flow meter at the time of sample collection.

The industrial sampling and analysis survey was based on the premise that samples would be collected from all industries fulfilling any of the following criteria: 1) major industry not presently included in the Ley Creek Sewerage System; 2) industry with significant potential toxicity problems, e.g., metals, cyanides, phenols; and 3) industry whose organic load was considered to be a significant fraction of the present Ley Creek Treatment Plant organic load. The information would be used to assess the contribution of each sampled industry to the wastewater treatability problem in the Ley Creek Drainage Area and also to provide information helpful to each industry's waste management program.

Grab and composite (up to 24 hours) samples were collected from the selected industries. Flows over the sampling period were obtained by water meter readings, lithium dilution technique, bucket and stopwatch, orifices, or combinations thereof. The most common method used was the lithium dilution technique, in which a known standard solution of lithium chloride is added at a constant rate to the wastewater upstream of the sampling point. The lithium concentration measured in the collected samples is the basis for the calculation of the wastewater flow rate. Average loadings during the compositing period were estimated as the product of the measured contaminant concentration and the average flow during the sampling period.

With the expansion of the scope to include the Metropolitan Sewage Treatment Plant wastewater, a sampling survey was conducted on the plant influent to obtain an estimate of the magnitude of flow and of contaminant concentrations in order to determine the significance of combining Ley Creek and Metropolitan wastewaters. Twenty-eight random grab samples were collected on the influent wastewater during the period from September 3 through September 10, 1968 and were analyzed for the same contaminants outlined in the Ley Creek Treatment Plant survey. Influent flows were measured concurrently with sampling.

Survey Results

Discussions of each industry known to be within the Ley Creek Sanitary District (and extensions) are presented in the Interim Report, *Industrial Discharges in the Ley Creek Sanitary District*, dated 1 March 1969. Included for each industry are a brief outline of manufacturing process, a description of wastewater production and disposal, and recommendations for wastewater management procedures. Nineteen industries were considered to have wastewater characteristics which required sampling and analysis. Descriptions of these sampling and analysis surveys are included in the respective industrial discussions. The locations of those industries sampled are shown in Drawing B-2.

The estimated wastewater characteristics of all industries contacted are summarized in Table 1. Also included in Table 1 are the points of discharge (Ley Creek Treatment Plant, Ley Creek, or other) and the potentials for clean-water segregation.

Within the Ley Creek Drainage Area, approximately 9.1 mgd of wastewater were accounted for in the survey. Approximately 3.3 mgd of wastewater are being discharged directly to Ley Creek or its tributaries; of this total, approximately 2.7 mgd are the total process wastewaters of the Crouse-Hinds Co., Will and Baumer Candle Company, General Motors-Ternstedt Division, and Syracuse China Corporation. Approximately 5.8 mgd of industrial wastewaters go to the Ley Creek Sewage Treatment Plant, of which 0.2 mgd are relatively uncontaminated (of could be made so) and could be diverted to storm sewers.

The results of the Ley Creek Sewage Treatment Plant influent sampling and analysis survey are contained in Appendix A. The raw, ranked raw, extended, and ranked extended data are listed in Tables A-1 through A-4, respectively. A summary of these results is presented in Table 2. The sampling survey defined a wastewater highly variable in organic load but without significant toxicity problems. BOD_5 concentrations ranged from 117 mg/L to 1,620 mg/L during the 7-day survey, with a median concentration of 389 mg/L; the median BOD_5 loading was 47,800 pounds per day. Metal concentrations were generally quite low; the maximum metal level, obtained by adding the maximum observed concentrations of chromium, copper, zinc, cadmium, and nickel, was less than 4 mg/L.

A comparison of the wastewater characteristics observed at the Ley Creek Sewage Treatment Plant influent with the summation of estimated industrial and municipal discharges is presented in Table 3. Samples of the Ley Creek influent were taken to reflect the loading

A

Table

Summary of Estimated Industrial Waste Character
Extended Ley Creek Sanitary District

Company	Products or Services	Number of Employees	Water Use gal/day	Plant Effluent gal/day	Discharge to Ley Creek S.T.P. Sanitary gal/day	Industrial gal/day	Ley Creek Industrial gal/day	BOD
Acorn Tool Co.	Repairs air conditioners	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Advanced Welding Co.	Welded metal products	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Airco Plating Co.	Electroplated metals	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Air-Pro Co.	Metal and plastic prototype units	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Alpen Manufacturing Co.	Machining and anodizing metals	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Allied Tool Corp.	Machined metal parts	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Barnes and Cone, Inc.	Masonry building blocks	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Beehner, Ray F. and Co.	Wooden church furniture	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Bliss Steel Co.	Fabricates window sash	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Bonac, Inc.	Electronic control panels	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Borden Co.	Ice cream	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Bristol Laboratories	Antibiotics	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Burkhard Brothers, Inc.	Rebuilds machinery	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Burnett Processes, Inc.	Filters	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Burroughs, F. C. and Son	Metal polishing and buffing	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Canada Dry Bottling Co.	Soft drinks	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Carrier Corp.	Air conditioning and refrigeration equipment	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Cast-O-Matic Corp.	Aluminum and zinc die castings	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Chrysler Corp.	Automotive transmissions	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	not measured	[illegible]
Clicquot Club Bottling Co.	Soft drinks	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Colucci, T. A. Printing Co.	Printed forms	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Continental Can Co.	Corrugated containers	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Cook, E. F. Co.	Machined metal parts	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Corenco	Renders fat, bones, etc.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Crispy Maid Potato Chip Co.	Potato chips	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Crouse Hinds	Illuminating fixtures	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Curry, McLaughlin and Len, Inc.	Electronic instruments	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Custom Sheet Metal Corp.	Sheet metal	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Dairymen's League Cooperative Association	Milk and milk products	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
DeLima, Paul Co., Inc.	Roasted coffee	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Eagle Metalcraft	Aluminum products	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Fairbanks Dairies	Bottled milk distribution	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Fairmont Chemical Co.	--	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Falso Industries, Inc.	Fabricated metal	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Franklin Engine Co.	Aircraft engines	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Frey's Pattern Shop	Patterns and castings	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Friedal, J. F. Paper Box Co.	Paper boxes	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Gaebel Enterprises Inc.	Metal rulers and scales	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Gardall Corp.	Safes	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
G. E. - Court Street	Military electronics	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
G. E. - Electronics Park	Semi-conductors and TV tubes	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
General Motors Corp.	Automotive hardware	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
General Super Plating	Electroplates metals	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Green's Paste Works	Adhesive paste	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Hoffman Industries	Blowers, vacuum and filtration equipment	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Industrial Fabricating Corp.	Metal fabrication	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Iroquois Door Co.	Doors and wood products	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Jessel Marking Equipment Co.	Rubber stamps	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Jones, W. E. Machine Products Co.	Screw machine products	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Kilian Manufacturing Co.	Ball bearing rings	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Lamson Div. - Diebold, Inc.	Air tube systems	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Lemoyne Machine Products Corp.	Machined metals	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Lennox Industries, Inc.	Heating and air conditioning units	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Liberty Combustion Corp.	Combustion equipment	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Lix Brothers	Metal stampings	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Mark's Machine and Tool Corp.	Machined metal	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Mastech, Inc.	Electronic testing equipment	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Mathews Lumber Co., Inc.	Lumber and building supplies	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
McIntosh Box and Lumber Co., Inc.	Wooden boxes	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Meloon Foundries, Inc.	Aluminum and bronze castings	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Metal Finishing Supply, Inc.	Coated plating racks	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Morse Manufacturing Co., Inc.	Barrel handling equipment	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Mutual Library Bindery	Binds books, magazines, etc.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
National Plating Co.	Electroplates metals	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

B

Table 1

Industrial Waste Characteristics
Creek Sanitary District

					Major Contaminants, lbs/day					Potential Clean Water Segregation gpd	Remarks
BOD	SS	pH Range	Oil grease	CN	Cr	Cd	Ni	Cu	Zn		
1	1	6-9	-	-	-	-	-	-	-	-	
[illegible]	[illegible]	6-9	-	-	-	-	-	-	-	-	
[illegible]	6	[illegible]	-	[illegible]	-	[illegible]	-	[illegible]	-	-	On septic tank system
1	4	6-9	-	-	-	-	-	-	-	-	
1	1	-	-	-	<1	-	-	-	<1	-	Combined with Miller Electroplating and Anodizing Co., discharge to Metropolitan S.T.P.
[illegible]	[illegible]	6-9	-	-	-	-	-	-	-	-	On septic tank system
[illegible]	[illegible]	6-9	-	-	-	-	-	-	-	-	Sanitary wastewater to septic tank, water used in product
1	[illegible]	6-9	-	-	-	-	-	-	-	-	
5	5	6-9	-	-	-	-	-	-	-	-	
[illegible]	[illegible]	6-9	-	-	-	-	-	-	-	-	On septic tank system
10	[illegible]	6-9	<1	-	-	-	-	-	-	-	
19,000	87,608	[illegible]	-	-	-	-	-	-	-	yes	Volume of clean water not determined
5	5	6-9	-	-	-	-	-	-	-	-	Process water to subsurface disposal
6	8	6-9	-	-	-	-	-	-	-	-	
1	1	6-9	-	-	-	-	-	-	-	-	
[illegible]	[illegible]	[illegible]	-	-	-	-	-	-	-	-	Water used in product
300	[illegible]	[illegible]	-	-	[illegible]	-	-	[illegible]	[illegible]	-	Approximately [illegible] gpd unaccounted for
8	8	6-9	-	-	-	-	-	-	-	[illegible]	
[illegible]	240	[illegible]	[illegible]	-	-	-	-	-	-	[illegible]	Increasing size of facilities and installing new treatment plant
10 a	10 a	6-11	-	-	-	-	-	-	-	-	Sanitary wastewater to septic tank; industrial to creek; water used in product
[illegible]	[illegible]	6-9	-	-	-	-	-	-	-	-	
[illegible]	[illegible]	[illegible]	-	-	-	-	-	-	[illegible]	[illegible]	Cooling and process wastewater to Ley Creek
[illegible]	[illegible]	6-9	-	-	-	-	-	-	-	-	On septic tank system
[illegible]	400	[illegible]	[illegible]	-	-	-	-	-	-	-	
[illegible]	100	[illegible]	-	-	-	-	-	-	-	-	
[illegible]	600 a	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	yes	Volume of clean water not determined; process wastewater and cooling water to stream
8	8	6-9	-	-	-	-	-	<1	<1	-	
1	1	6-9	-	-	-	-	-	-	-	-	
750 a	1,750 a	6-11	-	-	-	-	-	-	-	[illegible]	Wastewater to Metropolitan S.T.P.
2	2	6-9	-	-	-	-	-	-	-	[illegible]	
6	50	[illegible]	-	-	[illegible]	-	-	-	-	[illegible]	
[illegible]	[illegible]	6-9	-	-	-	-	-	-	-	[illegible]	No processing or bottling
1	1	6-9	-	-	-	-	-	-	-	-	Out of business
[illegible]	1	6-9	-	-	-	-	-	-	-	-	
20	20	6-9	-	-	-	-	-	-	-	[illegible]	
[illegible]	[illegible]	5-9	-	-	-	-	-	-	-	-	Process wastewater to Bloody Brook
[illegible]	[illegible]	6-9	-	-	-	-	-	-	-	-	On septic tank system
1	1	6-9	-	-	-	-	-	-	-	-	
1	[illegible]	6-9	-	-	[illegible]	-	-	-	-	-	
500	500	[illegible]	-	[illegible]	[illegible]	[illegible]	-	-	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]	-	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-	
[illegible]	[illegible]	[illegible]	-	-	[illegible]	-	[illegible]	[illegible]	[illegible]	-	
[illegible]	[illegible]	[illegible]	-	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-	-	
[illegible]	[illegible]	6-9	-	-	-	-	-	-	-	[illegible]	
[illegible]	[illegible]	6-9	-	-	-	-	-	-	[illegible]	[illegible]	Discrepancy between meter reading and estimated effluent flow
[illegible]	[illegible]	6-9	-	-	-	-	-	-	-	-	
[illegible]	[illegible]	6-9	-	-	-	-	-	-	-	-	Sanitary to septic tank
[illegible]	[illegible]	6-9	-	-	-	-	-	-	-	-	Cooling water to ground
[illegible]	1	6-9	-	-	-	-	-	-	-	-	
[illegible]	[illegible]	[illegible]	<1	<1	-	-	-	-	-	-	Effluent to Metropolitan S.T.P.
[illegible]	[illegible]	[illegible]	-	-	-	-	-	-	-	-	
[illegible]	[illegible]	6-9	-	-	-	-	-	-	-	-	
[illegible]	[illegible]	[illegible]	-	-	-	-	-	-	[illegible]	[illegible]	Clean water from number of sources
[illegible]	[illegible]	[illegible]	-	-	-	-	-	-	-	-	Contaminated wastewater should be added to sewer
[illegible]	[illegible]	[illegible]	-	-	-	-	-	-	-	[illegible]	
[illegible]	[illegible]	[illegible]	-	-	-	-	-	-	-	[illegible]	
[illegible]	[illegible]	[illegible]	-	-	-	-	-	-	-	-	
[illegible]	[illegible]	[illegible]	-	-	-	-	-	-	-	-	
[illegible]	[illegible]	[illegible]	-	-	-	-	-	-	-	[illegible]	
[illegible]	8	[illegible]	-	-	-	-	-	-	-	-	Water used to wash sand
[illegible]	[illegible]	[illegible]	-	-	-	-	-	-	-	[illegible]	
[illegible]	[illegible]	[illegible]	-	-	-	-	-	-	-	-	
[illegible]	[illegible]	[illegible]	-	-	-	-	-	-	-	[illegible]	
[illegible]	[illegible]	[illegible]	-	-	-	-	-	-	-	[illegible]	

A

Table 1
(Continued)

Company	Products or Services	Number of Employees	Water Use gal/day	Plant Effluent gal/day	Discharge to Ley Creek S.T.P. Sanitary gal/day	Discharge to Ley Creek S.T.P. Industrial gal/day	Discharge to Ley Creek Industrial gal/day	BOD	SS
[illegible] Foundries, Inc.	Aluminum and bronze castings	[illegible]	[illegible]	[illegible]	10,000	-	75,000	60	[illegible]
Onondaga Tool Machine Co.	Machined metal parts	[illegible]	[illegible]	[illegible]	90	-	-	1	[illegible]
Orso Office Records Co., Inc.	Binders, folders, etc.	[illegible]	[illegible]	[illegible]	50	-	-	1	[illegible]
Paliotta Iron works	Steps, railings, etc.	[illegible]	[illegible]	[illegible]	50	-	-	1	[illegible]
Pattern Maker's, Inc.	Metal and wood patterns	[illegible]	400	400	400	-	-	5	[illegible]
Penny Curtiss Baking Co., Inc.	Bread and pastry	[illegible]	[illegible]	[illegible]	900	59,000	-	40	[illegible]
Pepsi-Cola Syracuse Bottlers, Inc.	Soft drinks	[illegible]	[illegible]	[illegible]	4,000	13,000	-	180	[illegible]
Prestolite Div. - Eltra Corp.	Direct current motors	[illegible]	[illegible]	[illegible]	12,000	600,000	40,000	120	[illegible]
Prince Tool and Die Labs, Inc.	Tools and dies	[illegible]	[illegible]	[illegible]	100	-	-	[illegible]	[illegible]
Radar Design Corp.	Electronic components	[illegible]	[illegible]	[illegible]	500	-	-	[illegible]	[illegible]
Ralph Packing Co.	Cattle slaughtering and meat products	[illegible]	[illegible]	[illegible]	400	99,600	-	505	[illegible]
Roth Bros. Metal Co.	Scrap metal	[illegible]	[illegible]	50,000	1,000	24,000	-	10	[illegible]
Roth Smelting Co.	Aluminum ingots	[illegible]	[illegible]	25,000	550	12,650	-	5	[illegible]
Salt City Supply Co.	Building supplies	[illegible]	[illegible]	[illegible]	100	-	-	1	[illegible]
Sanford Fire Apparatus Corp.	Fire truck bodies	[illegible]	[illegible]	[illegible]	-	-	-	[illegible]	[illegible]
Sanitary Process Equipment Corp.	Heat exchange equipment	[illegible]	[illegible]	[illegible]	-	-	-	[illegible]	[illegible]
Sawyer Industries, Inc.	Sprockets, gears	[illegible]	[illegible]	[illegible]	-	-	-	2[1]	[illegible]
Schroeder Machines Corp.	Packaging machinery	[illegible]	[illegible]	[illegible]	400	-	-	4	[illegible]
Seiter, E. L. Lumber Co.	Wood pallets and skids	[illegible]	[illegible]	90	90	-	-	1	[illegible]
Sylflock Screw Product Co.	Screw machine products	[illegible]	[illegible]	[illegible]	200	20	-	5	[illegible]
Shanahan Tool and Die Corp.	Machined metal parts	[illegible]	[illegible]	[illegible]	100	-	-	2	[illegible]
Siefen Compounds, Inc.	Liquid buffing compounds	[illegible]	[illegible]	[illegible]	-	-	-	10[1]	[illegible]
Sims Casting	Aluminum castings	[illegible]	[illegible]	[illegible]	550	-	-	15	[illegible]
Sims Matchplate Corp.	Precision patterns	[illegible]	[illegible]	[illegible]	325	-	-	[illegible]	[illegible]
Spaulding Metal Co., Inc.	Non-ferrous tin dippings	[illegible]	[illegible]	[illegible]	90	10	-	1	[illegible]
Steps and Rails, Inc.	Awnings	[illegible]	[illegible]	[illegible]	-	-	-	2[1]	[illegible]
Stewart, W. H., Inc.	Sewer cleaning Equipment	[illegible]	[illegible]	[illegible]	210	-	-	3	[illegible]
Stickley Manufacturing Co.	Wooden furniture	[illegible]	[illegible]	[illegible]	190	-	-	[illegible]	[illegible]
Sulzle, B. G., Inc.	Surgical needles	[illegible]	[illegible]	[illegible]	1,000	18,000	-	20	[illegible]
Super Heat Treating, Inc.	Heat treated metal	[illegible]	[illegible]	[illegible]	-	-	55,870	2	[illegible]
Swenton Tool and Die Co.	Tools and dies	[illegible]	[illegible]	[illegible]	100	50	-	1	1
Syracuse Brick Corp.	Building materials	[illegible]	[illegible]	[illegible]	100	-	-	1	1
Syracuse China Corp.	Institutional china	[illegible]	[illegible]	[illegible]	56,000	-	164,000	150	5,000[1]
Syracuse Concrete Pipe and Products Corp.	Concrete pipe	[illegible]	[illegible]	5,550	550	-	9,000	5	5
Syracuse Die Casting and Manufacturing Co.	Die castings	[illegible]	5,000	5,000	80	2,900	-	1	1
Syracuse Gauge Co., Inc.	Pressure gauges	[illegible]	100	100	120	40	-	2	2
Syracuse Old Fashion Beverages	Soft drinks	[illegible]	11,500	[illegible]	100	3,400	-	40	20
Syracuse Pharmacal Co., Inc.	Package pharmaceuticals	[illegible]	140	140	-	-	-	5[1]	2[1]
Syracuse Ready Mix Co.	Ready-mix concrete	[illegible]	[illegible]	[illegible]	150	-	950	[illegible]	10
Syracuse Mid-State Spring Corp.	Coil springs	[illegible]	300	[illegible]	200	-	-	[illegible]	[illegible]
Temple Farms Dairy, Inc.	Milk	[illegible]	4,000	4,000	300	5,800	-	5	[illegible]
Thomas Foundry, Inc.	Aluminum and bronze castings	[illegible]	1,000	[illegible]	-	-	-	1[1]	1[1]
Thor Metal Products	Heating supplies	[illegible]	[illegible]	[illegible]	350	1,450	-	6	6
Titan Box Company	Wooden boxes	[illegible]	[illegible]	[illegible]	-	-	-	5[1]	5[1]
Union Carbide Corp., Linde Div.	Industrial gases	[illegible]	[illegible]	[illegible]	350	8,000	10,000	5	5
Valcar Sheet Metal Corp.	Air ducts	[illegible]	1,700	[illegible]	700	-	1,000	5	5
Van Sandford Tool Corp.	Tools and dies	[illegible]	[illegible]	[illegible]	200	-	200	[illegible]	[illegible]
Walker Corp. and Co., Inc.	Pharmaceuticals	[illegible]	[illegible]	[illegible]	400	350	-	5	5
Wholesale Cooperative Meat Dealers, Inc.	Slaughtered cattle	[illegible]	[illegible]	[illegible]	40	24,900	-	150	150
Wickhardt Co., Inc.	Plastic laminations	[illegible]	[illegible]	[illegible]	-	-	-	2[1]	2[1]
Will and Baumer Candle Co., Inc.	Candles and slab wax	[illegible]	[illegible]	[illegible]	3,300	-	417,900	100	20
Wood Preserving Co., Inc.	Treated lumber	[illegible]	[illegible]	[illegible]	10	50	-	1	1
Young, H. C., Tool and Machine Co., Inc.	Tool and dies	[illegible]	[illegible]	[illegible]	50	-	-	1	1
Young and Franklin Tool works, Inc.	Tool and dies	[illegible]	[illegible]	[illegible]	140	-	-	6	6
Total					[illegible]	[illegible]	[illegible]	52,869	51,460

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[1] Not added in total

B

able
tinued)

Major Contaminants, lbs/day										Potential Clean Water Segregation gal.	Remarks
BOD	SS	pH Range	Oil grease	CN	Cr	Cd	Ni	Cu	Zn		
60	60	6-9	-	-	-	-	-	-	-	-	Water used to moisten sand; cooling water to creek
1	1	6-9	-	-	-	-	-	-	-	-	
1	1	6-9	-	-	-	-	-	-	-	-	Did not visit
1	1	6-9	-	-	-	-	-	-	-	-	
5	5	6-9	-	-	-	-	-	-	-	-	
90	90	6-9	-	-	-	-	-	-	-	10,000	
180	100	6-11	-	-	-	-	-	-	-	-	Water used in product
120	300	4.8-7.6	58	18.6	4.5	6.7	0.3	7.2	27.5	-	
1	1	6-9	-	-	-	-	-	-	-	-	
5	5	6-9	-	-	-	-	-	-	-	-	
500	350	5.5-6.6	500	-	-	-	-	-	-	75,000	
10	10	-	-	-	-	-	-	-	-	-	Did not tour facilities
5	10	7-9	-	-	-	-	-	-	<2	10,000	
1	1	6-9	-	-	-	-	-	-	-	-	Formerly Susco Block Co.
3[1]	3[1]	6-9	-	-	-	-	-	-	-	-	Out of Ley Creek Sanitary District
2[1]	2[1]	6-9	-	-	-	-	-	-	-	-	Sanitary wastewater to septic tank; clean water from testing to ground
2[1]	3[1]	6-9	-	-	-	-	-	-	-	-	On septic tank system
4	4	6-9	-	-	-	-	-	-	-	-	
1	1	6-9	-	-	-	-	-	-	-	-	
3	3	6-9	-	-	-	-	-	-	<5	-	
2	2	6-9	-	-	-	-	-	-	-	-	
10[1]	5[1]	-	-	-	-	-	-	-	-	-	Discharge to Metropolitan S.T.P.
15	20	6-9	-	-	-	-	-	-	-	-	
5	5	6-9	-	-	-	-	-	-	-	-	
1	1	5-9	-	-	-	-	-	-	<1	-	Includes Safeguide Cutter Co.
2[1]	2[1]	6-9	-	-	-	-	-	-	-	-	Sanitary wastewater to septic tank; formerly Cashier Translucent Awning Co.
3	3	6-9	-	-	-	-	-	-	-	-	
2	2	6-9	-	-	-	-	-	-	-	-	Will be moving out of Ley Creek Drainage Area
20	20	6-9	-	-	-	-	-	-	-	18,000	Not allowed to tour facilities
2	2	6-9	-	-	-	-	-	-	-	-	Sanitary wastewater to septic tank; plan to reuse clean quench water now discharged
1	1	6-9	-	-	-	-	-	-	-	30	
1	1	6-9	-	-	-	-	-	-	-	-	No production; sales only
120	3,000[1]	5.8-7.9	-	-	-	-	-	-	-	-	Process wastewater to Ley Creek
5	5	-	-	-	-	-	-	-	-	-	Water used in product
1	1	6-9	<1	-	-	-	-	-	-	2,900	
2	2	6-9	-	-	-	-	-	-	<1	-	
40	20	6-11	-	-	-	-	-	-	-	-	Water used in product
5[1]	2[1]	6-9	-	-	-	-	-	-	-	-	Wastewater to septic tank
8	10	6-9	-	-	-	-	-	-	-	-	Water used in product
2	7	6-9	-	-	-	-	-	-	-	-	
5	3	5-9	-	-	-	-	-	-	-	-	
2[1]	1[1]	6-9	-	-	-	-	-	-	-	-	Sanitary wastewater to septic tank
6	6	6-9	-	-	-	-	-	-	-	1,490	
5[1]	5[1]	6-9	-	-	-	-	-	-	-	-	Out of Ley Creek S.T.P. Area; sanitary wastewater to septic tank
3	3	6-9	-	-	-	-	-	-	-	5,000	10,000 gpd CaOH solution to lagoon
5	5	6-9	-	-	-	-	-	-	-	-	
2	2	6-9	-	-	-	-	-	-	-	-	
5	5	6-9	-	-	-	-	-	-	-	-	
150	150	5-8	200	-	-	-	-	-	-	-	Production halted; property appropriated
7[1]	2[1]	6-9	-	-	-	-	-	-	-	-	Sanitary wastewater to septic tank
100	20	6.3-7.6	-	-	-	-	-	-	-	-	Approximately 500,000 gpd of saline cooling water
1	1	-	<1	-	-	-	-	-	<1	-	
1	1	6-9	-	-	-	-	-	-	-	-	
6	6	6-9	-	-	-	-	-	-	-	-	
[illegible],869	51,400		1,259	51.6	28.1	35.9	[illegible]	[illegible]	[illegible]	[illegible]	

Table 2

Wastewater Characteristics[1]
Ley Creek Sewage Treatment Plant Influent

Probability of Occurrence	mg/L			Pounds/Day		
	10%	50%	90%	10%	50%	90%
Flow, MGD	9.6	14.0	17.3	9.6	14.0	17.3
BOD_5	202	389	725	25,400	47,800	72,800
BOD_{uc}	272	560	908	31,500	69,600	103,000
COD	441	944	1,510	54,800	102,000	188,600
pH	6.3	7.0	7.8	6.3	7.0	7.8
Acidity[2]	0	0	28.0	0	0	3,340
Alkalinity[2]	0	0	50.0	0	0	4,780
S.S.	191	456	1,293	21,000	54,200	164,000
V.S.S.	137	260	547	14,400	29,500	64,400
Oil and Grease	45.5	79.5	153.0	4,700	8,600	20,000
Cyanide	0.001	0.019	0.18	0.1	2.0	27.0
Phenol	0.04	0.17	0.66	3.4	19.5	80.0
Chromium	0.14	0.26	0.56	11.7	30.4	76.9
Copper	0.12	0.26	0.50	11.3	32.5	62.9
Zinc	0.33	0.74	1.09	33.6	93.8	129.6
Cadmium	0.02	0.05	0.15	1.6	5.9	19.6
Nickel	0.032	0.145	0.235	4.0	15.6	28.4
NH_3-N	10.5	15.4	23.9	1,000	1,775	2,730
Org-N	15.8	26.5	44.4	1,560	3,110	5,120
Ortho-PO_4	11.0	25.0	40.0	1,080	2,960	4,840
Total PO_4	22.0	54.0	80.0	1,970	6,760	10,390

[1] Dry Weather
[2] To pH 7

Table 3

Comparison of Observed and Estimated
Ley Creek Sewage Plant
Influent Characteristics

Parameter[3]	Observed Ley Creek Influent			Industrial Survey	Municipal[2] Estimates	Estimated Total Ley Creek Influent
	Mean	Median	Range	Mean	Mean	Mean
Flow (MGD)	13.7	14.0	8.7-18.8	5.8	4.0	9.8
BOD_5	51,100	47,800	15,400-202,000	32,900	8,000	40,900
Suspended Solids	74,800	54,200	1,600-326,000	51,400	8,000	60,000
Oil and Grease[1]	10,300	8,600	2,600-22,500	1,300	1,330	2,600
Cyanide	8.7	2.0	0.1-96.0	51.6	---------	51.6
Chromium	39.9	30.4	10.2-199	28.1	---------	28.1
Copper	34.6	32.5	9.1-76.2	45.9	---------	45.9
Zinc	84.8	93.8	18.1-183.2	69.0	---------	69.0
Cadmium	8.4	5.9	1.5-40.5	23.9	---------	23.9
Nickel	16.2	15.6	2.0-38.2	26.0	---------	26.0

[1] CCl_4 Extractables.
[2] Assuming population of 40,000.
[3] Pounds per day except as noted.

over a 24-hour period. However, the majority of industries sampled operate on a one- or two- shift basis. In those instances where samples were mainly representative of the working shifts only, the values obtained were adjusted so that they could be compared to the Ley Creek influent on a more equitable basis. This adjustment consisted of dividing the mean values by the fraction of the day that the waste producing processes were in operation. For the municipal discharge, the flow, BOD_5, suspended solids, and oil and grease loadings were estimated for the approximately 40,000 people within the Ley Creek Sanitary District. Estimated and observed loadings generally were in agreement, the only notable exception being the oil and grease (carbon tetrachloride extractables) values; only 30 percent of the mean oil and grease content in the Ley Creek Sewage Treatment Plant influent could be accounted for in the estimated industrial and municipal discharges. It should be noted that samples were taken for oil and grease only in those industrial wastewaters where it was considered very likely to be present (i.e., slaughter houses, rendering plants, processes using lubricating or cutting oils).

The information obtained from the industrial interviews and from the sampling and analysis surveys indicates that most of the organic loading discharged to the Ley Creek Sewage Treatment Plant is contributed by Bristol Laboratories.

Although there does not appear to be a toxicity problem at the treatment plant, unacceptable concentrations of metals and cyanides were noted at some industries. Definite restrictions must be placed on these industries to prevent the batch dumping of metals and cyanides; these restrictions should be consistent with the *Rules and Regulations Governing the Use of Public Sewers* promulgated by the Onondaga County Division of Drainage and Sanitation. A copy of these rules and regulations is attached in Appendix C.

The results of the influent sampling survey on the Metropolitan Treatment Plant, along with the corresponding flow measurements, were statistically analyzed. The raw, ranked raw, extended, and ranked extended data from this survey are listed in Tables A-5 through A-8, respectively. A summary of the 50 and 90 percent occurrence values from this statistical analysis is shown in Table 4. The sampling survey defined a wastewater relatively weak in organic concentration (compared to normal domestic sewage) and generally containing only trace concentrations of heavy metals. BOD_5 concentrations ranged from 30 mg/L to 183 mg/L during the 7-day survey, with a median concentration of 101 mg/L; the median BOD_5 loading was 37,600 pounds per day. Heavy metals generally were present only in trace amounts; however, there were a few occurrences of measurable concentrations. The maximum level, obtained by adding the maximum observed concentrations of chromium, copper, zinc, cadmium, and nickel, was less than 5 mg/L. Oil and grease concentrations were at normal levels; however, Onondaga County personnel have on occasion observed significant amounts of floating oil entering the treatment plant.

The wastewater characteristics observed at the Ley Creek and Metropolitan Sewage Treatment Plants are shown in Table 5. These two wastewaters contain approximately the same organic and total metals loadings (in pounds/day), but the wastewater volume at the Metropolitan Plant is about 3 times the volume at the Ley Creek Treatment Plant.

Future Expansion in Wastewater Flow and Loads

The results of the influent surveys conducted on both treatment plants represent the present flow and organic loadings. Since a treatment plant should be designed for some future design period (generally 20 years), and since it is anticipated that both the sanitary and

Table 4

Wastewater Characteristics[1]
Metropolitan Sewage Treatment Plant Influent

Probability of Occurrence	mg/L			Pounds/Day		
	10%	50%	90%	10%	50%	90%
Flow, MGD	29.7	46.0	58.6	29.7	46.0	58.6
BOD_5	36.0	101	155	10,200	37,600	78,600
BOD_{uc}	59.0	131	196	18,000	48,800	96,000
COD	78.0	261	458	23,600	108,100	221,900
pH	6.3	6.8	7.0	6.3	6.8	7.0
Acidity[2]	5.0	10.0	48.0	1,790	0	20,700
Alkalinity[2]	0	0	0	0	3,230	0
S.S.	40.0	128	217	10,200	48,000	100,000
V.S.S.	36.0	99.0	171	9,200	40,000	74,000
Oil and Grease	4.7	27.3	55.5	1,300	9,500	30,100
Cyanide	0.010	0.017	0.061	2.8	6.4	27.2
Phenol	0.010	0.025	0.140	2.8	8.4	69.4
Chromium	0.10	0.16	0.60	27.7	63.5	255.1
Copper	0.058	0.110	0.242	11.2	41.5	110.8
Zinc	0.11	0.25	0.93	29.7	97.9	417.2
Cadmium	0.05	0.05	0.05	12.2	18.9	24.4
Nickel	0.05	0.08	0.16	12.2	27.7	63.8
NH_3-N	4.9	8.4	14.4	1,360	3,290	5,475
Org-N	1.3	5.5	9.4	480	1,565	4,540
Ortho-PO_4	6.4	18.5	28.6	1,565	7,390	13,600
Total PO_4	10.1	32.6	61.7	2,490	13,000	23,750

[1] Dry Weather.
[2] To pH 7.

Table 5

Comparison of Ley Creek and Metropolitan Sewage Treatment Plant
Influent Wastewater Characteristics

Parameter[1]	Ley Creek STP Influent			Metropolitan STP Influent		
	Mean	Median	Range	Mean	Median	Range
Flow (MGD)	13.7	14.0	8.7-18.8	44.5	46.0	21.0-76.0
BOD_5	51,100	47,800	15,400-202,400	39,300	37,600	9,100-87,400
BOD_{uc}	71,100	69,600	19,900-251,100	53,400	48,800	13,500-125,000
COD	116,000	102,000	26,300-342,000	103,800	108,100	14,700-255,000
pH	------------	7.0	6.0-8.8	6.7	7.0	6.2-7.2
Acidity	840	0	0-6,650	5,560	3,415	0-26,300
Alkalinity	1,320	0	0-23,100	115	0	0-3,200
S.S.	74,800	54,200	8,500-326,000	50,300	48,000	3,500-160,000
V.S.S.	36,400	29,500	7,700-106,000	40,800	40,000	2,500-109,000
Oil and Grease	10,300	8,600	2,600-22,500	13,700	9,500	1,300-30,100
Cyanide	8.7	2.0	0.1-96.0	10.9	6.4	2.2-74.2
Phenol	29.4	19.5	0.8-114.0	16.6	8.4	2.9-69.4
Chromium	39.9	30.4	10.2-199.0	115.6	63.5	15.7-649
Copper	34.6	32.5	9.1-76.2	50.1	41.5	10.8-127
Zinc	84.8	93.8	18.1-183.2	168.1	97.9	17.5-984
Cadmium	8.4	5.9	1.5-40.5	18.5	18.9	8.7-31.6
Nickel	16.2	15.6	2.0-38.2	33.6	27.7	8.7-105
NH_3-N	1,870	1,775	864-3,540	3,300	3,290	980-7,910
Org-N	3,280	3,110	980-6,820	2,110	1,565	0-5,160
Ortho-PO_4	3,240	2,960	730-15,300	7,130	7,390	1,100-16,600
Total PO_4	6,400	6,760	1,200-19,500	14,300	13,000	1,550-57,500

[1] Pounds per day except as noted.

industrial wastewater loads should increase, the projected increases in flow and organic loadings should be determined. Personnel at Onondaga County have indicated that the population increases over the next 20 years in the Ley Creek and Metropolitan Sanitary Districts should be almost 5,000 and 25,000, respectively. A reasonable basis for estimating the increases in flow and BOD loading is average per capita contribution of 100 gallons/day of flow and 0.2 lbs/day of BOD_5. At the present time, there are a few industries (listed in Table 1) which are discharging contaminated wastewaters to surface waters but which, with appropriate control, should be included in the collection system. This flow is estimated at 2 mgd, with the BOD estimated at 200 pounds/day. In addition, it is anticipated that new industries will discharge wastewaters to both the Ley Creek and Metropolitan Sanitary Districts, and that those already located in these areas may increase both their water usage and their organic discharge. An expansion factor of approximately 15 percent (2 mgd) has been allowed for the Ley Creek Sanitary District for this potential increase in average flow at an organic concentration of 300 mg/L BOD_5. The concentration used is the allowable limit established by Onondaga County's Sewer Ordinance. Similar increases in flow and organic concentration have been projected for the Metropolitan Sanitary District. The projected increases in flow and BOD_5 loadings are shown in Table 6.

Stormwaters

The collection system serving the Metropolitan Sanitary District is a combined sewer system, while the Ley Creek System is a separate sewer system. The combined sewer system

Table 6

Projected Increase in Flow and Organic Loading

Ley Creek Sanitary District	Flow MGD	Average BOD_5 lbs/day
Sanitary	0.5	1,000
Industry Not Presently Connected	2.0	200
Other Industrial Expansion	2.0	4,500
Total	4.5	5,700

Metropolitan Sanitary District		
Sanitary	2.5	5,000
Industrial Expansion	2.0	4,500
Total	4.5	9,500

collects not only municipal and industrial wastewaters, but also stormwater runoff. However, during and shortly after a heavy rainfall, flow through both these sewer systems increases. No attempt was made during the survey to determine the frequency or magnitude of stormwater runoff. However, estimates of the maximum storm flow that could be accommodated in the existing interceptor sewers have been made in previous studies for Onondaga County. These estimates (see Table 7) indicate the Metropolitan system could handle 175 mgd of storm flow and the Ley Creek system could handle 40 mgd.

Table 7

Storm Flow Capacity of the Major Interceptor Sewers

Sewer	Capacity MGD
Main Interceptor	120
Harbor Brook Interceptor	30
West Side Sanitary	20
Liverpool Sanitary	5
Metropolitan Sub-total	175
Ley Creek Sanitary Districts	40
Total	215

Summary of Wastewater Quantities and Characteristics

For use in design of facilities to handle the combined dry weather wastewater flow to both treatment plants, the 50 and 90 percent probability of occurrence values of flow and BOD_5 (with appropriate expansion factors) were computed by adding the respective values derived from the influent surveys at the two treatment plants. Addition of two 90 percent probabilities does not represent a true 90 percent probability for the combined system; such an addition would give a probability somewhere between 90 and 99 percent, because of the unlikelihood of simultaneous occurrence of the two individual 90 percent values. The design flows and BOD_5 loadings for the Metropolitan and Ley Creek Sewage Treatment Plants and the combined wastewaters are shown in Table 8.

The maximum stormwater flow is established by the maximum capacity of the sewer lines and has been estimated at 215 mgd. The organic loading during stormwater flow was not determined, but it will not affect the 90 percent occurrence design value, since storm flow conditions occur less than 10 percent of the time.

Existing Treatment Facilities

The duplicate facilities presently in operation at the Ley Creek Sewage Treatment Plant consist of bar screens, grit chambers, pre-aeration tanks, primary settling tanks, aeration tanks, final settling tanks, and chlorination facilities. A portion of the excess sludge is handled through digestion tanks and sludge-drying beds, with the remainder being pumped to the Metropolitan Sewage Treatment Plant for disposal.

A portion of the recent contract covering the construction of the pump station and force main contained provisions for additional modifications to the Ley Creek Sewage Treatment Plant. One of these modifications was the installation of baffles in the primary clarifiers for better flow distribution and for prevention of short circuiting through the tanks. Even though these tanks are hydraulically overloaded, this modification should result in better removal efficiencies.

Another modification being made includes the installation of four 5-horsepower mechanical aerators in each aeration basin of the original treatment plant, to supplement the existing aeration equipment. Prior to this modification, a portion of the flow had to be bypassed around the aeration tanks, since the available aeration capacity was not adequate to maintain the desired dissolved oxygen level. Preliminary observations made by Onondaga County personnel indicate that this modification can maintain dissolved oxygen in the system at the desired level without any bypassing of the influent wastewater.

The present intermediate treatment system at the Metropolitan Sewage Treatment Plant consists of a grit chamber, flocculation and settling tanks, chlorine contact tanks, and chlorine feed facilities. At the present time, an organic polymer is added to increase solids capture and BOD removal. The sludge solids removed from this wastewater are digested; the major portion of sludge is then pumped to the Solvay waste beds for disposal, while the remaining solids are centrifuged and stockpiled on-site.

Effects of Effluent on Ley Creek and Onondaga Lake

More than 90 percent of the present contamination in Ley Creek is traceable to the effluent from the Ley Creek Sewage Treatment Plant. Thus the effluent from the treatment plant is the major factor in making the waters of Ley Creek unsuitable for drinking water supply

Table 8

Summary of Design Flow and Organic Loadings

Ley Creek Wastewater	50 Percent Occurrence	90 Percent Occurrence
Flow, MGD		
Present	14.0	17.3
Projected Expansion[1]	4.5	4.5
Future Design	18.5	21.8
BOD, lbs/day		
Present	47,800	72,800
Projected Expansion[1]	5,700	5,700
Future Design	53,500	78,500
Metropolitan Wastewater		
Flow, MGD		
Present	46.0	58.6
Projected Expansion[1]	4.5	4.5
Future Design	50.5	63.1
BOD, lbs/day		
Present	37,600	78,600
Projected Expansion[1]	9,500	9,500
Future Design	47,100	88,100
Combined Ley Creek and Metropolitan Wastewaters		
Design Flow, MGD	69.0	84.9
Design BOD_5 Loading, lbs/day	100,600	166,600

[1] 90% occurrence value increased by 50% over the 50% occurrence value.

and for other uses with high water quality requirements. Upon final completion of the pumping stations and force main, raw or treated wastewater will be discharged to the Metropolitan Sewage Treatment Plant, thereby alleviating the wastewater discharge to Ley Creek. The removal of this effluent discharge should significantly improve the quality of Ley Creek downstream of the present Treatment Plant discharge.

Before the installation of primary treatment at the present Metropolitan Sewage Treatment Plant location, the water quality in Onondaga Lake was poor. According to the results of samples collected by Onondaga County, the construction of the original primary treatment facilities and the subsequent upgrading to the present "intermediate" treatment facility have improved the water quality in the lake. A formal sampling survey was started during the summer of 1968 (under FWPCA Contract No. WPRD 66-01-68) to determine the condition of Onondaga Lake, but the results are not yet available. However, with the combination of Ley Creek and Metropolitan wastewaters for treatment and the addition of tertiary treatment, the water quality in Onondaga Lake is expected to show additional improvement.

Stream Classification

The Water Pollution Control Board of the New York State Department of Health has established water quality standards for surface waters in the Onondaga Lake Drainage Area. The Board has issued a report entitled *Onondaga Lake Drainage Basin* (Oswego River Drainage Basin Survey, Series Report No. 1), in which it recommended water quality criteria. The southern section of Onondaga Lake (and that portion of Ley Creek below the treatment plant outfall) have been given a D classification. Highlights of the water quality criteria suggested by the New York State Department of Health for this stream classification and applicable to the combined discharge from the Metropolitan Sewage Treatment Plant are given in Appendix D.

The best usage of class D waters is agricultural or as a source of industrial cooling or process water. Class D waters are not acceptable for fishing, bathing, or as a source of water supply for drinking, culinary, or food-processing purposes. Special treatment may be required under particular circumstances to make the water satisfactory for industrial process use, and natural impurities may be present at various locations. Otherwise, the waters without treatment should be satisfactory for agricultural uses and for industrial process cooling water.

Treatment Requirements

The New York State Department of Health requires a minimum of secondary treatment for municipal effluents discharging into Ley Creek or Onondaga Lake. Secondary treatment is defined as that degree of treatment which will remove from 75 to 95 percent (depending upon local conditions) of the organic pollution load, as measured by the 5-day Biochemical Oxygen Demand test. Communications between Onondaga County personnel and the New York State Department of Health have indicated that a BOD_5 removal efficiency of 85 percent based on the average results of thirty consecutive 24-hour composite samples will be required.

The New York State Department of Health also requires chlorination and the removal of settleable solids as the minimum acceptable treatment of excess stormwater flow entering the treatment plant.

It is further anticipated that future regulatory requirements may recommend additional treatment to achieve an orthophosphate reduction of eighty percent. A tertiary treatment facility at the Metropolitan Treatment Plant is currently under consideration by Onondaga County to meet these requirements.

4

WASTEWATER COLLECTION MASTER PLAN

In the initial planning stages of this project, it was thought that a number of industrial plants in the Ley Creek Sanitary District were discharging wastewater directly to surface waters. The initial plant interviews and related sampling survey, however, disclosed that all plants with significant flow and/or contamination were discharging at least their sanitary wastewater to the Ley Creek system and the great majority were discharging both sanitary and industrial wastewaters to the system. Nevertheless, a number of these plants still discharge some contaminated wastewaters, along with cooling water and stormwater, directly to surface streams.

Industrial Wastewater

A compilation of the estimated industrial discharges to Ley Creek is presented in Table 9. Of the approximately 1,980,000 gallons per day discharged, two industries account for practically all of the wastewater. General Motors-Turnstedt Division discharges approximately 1 mgd of treated wastewater to Ley Creek, while Crouse-Hinds discharges approximately 745,000 gpd to a tributary of Ley Creek. Each month General Motors submits the results of daily (5 days/week) analyses of wastewater samples to the State Department of Health. Recent discussions between Onondaga County and the State Department of Health indicated that discharge of this treated wastewater to Ley Creek can be tolerated. Based upon the samples collected during our survey, the wastewater contained minimal amounts of organics and low concentrations of heavy metals. Therefore, it appears that this wastewater will not impair the quality of Ley Creek.

Crouse-Hinds is in the process of installing pretreatment systems and in-plant modifications to make its wastewater acceptable for discharge to the Ley Creek Collection System. The other industries listed on Table 9 discharge less than 235,000 gallons per day to surface drainage systems. These industries should comply with the recommendations made in the Interim Report, and in general should discharge their contaminated industrial wastewater to the Ley Creek Collection system. A hydraulic capacity of 2 mgd has been provided specifically for these industries in the projected expansion; however, the inclusion of these wastewaters is not expected to significantly change the characteristics of the total wastewaters. From the information obtained during the initial interviews, all of these industries (with the exception of Clicquot Club Bottling Company) presently discharge sanitary wastewater to the Ley Creek Collection System.

Sanitary Wastewater

During the initial plant interviews, a number of small industries (generally with less than 50 employees) indicated that they discharge sanitary wastewaters to on-site septic tank systems. These industries (listed in Table 10) discharge a total of approximately 2,200 gallons per day. Therefore, as long as this treatment system (septic tank and tile field) is effective and appropriate, it does not appear economically feasible to tie these plants into the municipal system. If they are connected later, the quantity and characteristics of their discharges should have no noticeable effect on the quantity and characteristics of the overall system wastewater.

Table 9

Summary of
Discharge of Contaminated Industrial Wastewaters
to Surface Drainage Systems

Industry	Volume Discharged to Surface Drain gpd	Type of Wastewater Discharged			Is Industry On Sewer System	Approximate Volume of Contaminated Wastewater	Remarks
		Industrial	Cooling	Stormwater			
Bristol Laboratories	23,000	X	X	X	Yes	< 5,000	Some contamination observed in storm sewer - segregate to industrial sewer.
Carrier Corp.	50,000[1]	X	X	X	Yes	< 50,000	Contamination observed in outfall to creek - segregate to industrial sewer.
Chrysler Corp.	40,000	X	X	X	Yes	< 10,000	Traces of oil observed in storm sewer - remove to industrial sewer.
Clicquot Club Bottling Co.	2,300	X			No	2,300	Industrial and sanitary wastewater should be discharged to sewer system.
Continental Can Co.	20,600	X			Yes	20,600	Discharge contaminants on plant site - should be discharged with sanitary wastewater to Metropolitan S.T.P.
Crouse-Hinds	745,000	X			Yes	745,000	Will be connecting to sewer system
Franklin Engine Co.	68,500	X	X		Yes	< 20,000	Contaminated wastewater should be discharge to sewer.
G. E. - Electronics Park	200,000	X	X	X	Yes	< 10,000	Trace contaminants should be removed from storm sewer.
General Motors Corp. - Ternstedt Div.	1,470,000	X	X	X	Yes	1,000,000	Contaminants reduced in G.M. treatment plant May be required to discharge to other than Ley Creek.
Liberty Combustion Corp.	1,020	X	X		Yes	< 1,000	Contaminants should be discharged to sewer.
Prestolite Div. - Eltra Corp.	40,000[1]	X	X	X	Yes	< 20,000	Contaminants observed in storm sewer - should be segregated to industrial sewer.
Syracuse China Corp.	164,000	X	X		Yes	< 50,000	Solids should be removed or recycled in plant - Clean waters can be discharged to Ley Creek.
Syracuse Concrete Pipe and Products Corp.	5,000	X		X	Yes	< 5,000	Remove solids-discharge uncontaminated wastewaters to creek.
Syracuse Ready Mix Co.	950	X		X	Yes	< 1,000	Remove contaminants-discharge clean waters to stream.
Union Carbide Corp., Linde Div.	10,000	X		X	Yes	10,000	Discharging to settling pond - supernatent will enter creek when pond is full-should be investigated at that time.
Will and Baumer Candle Co.	418,000	X	X		Yes	< 20,000	Saline cooling water should be discharged to creek. Contaminated wastewater should be discharged to collection system.
TOTAL	3,209,000					1,970,000[2]	

Note: Less than 185,000 GPD of contaminated wastewater discharged if Crouse-Hinds and General Motors are excluded.

[1] Estimate

[2] Approximate total ± 10% of average values.

Table 10

Summary of Industrial Discharge of Sanitary Wastewaters to On-Site Septic Tank Systems

Industry	Estimated Volume of Sanitary Wastewaters gpd
Advanced Welding Company	40
Allied Tool Corporation	190
Barnes and Cone, Incorporated	220
Bomac, Incorporated	140
Clicquot Club Bottling Company	70
Cook, E. F. Company	50
Frey's Pattern Shop	70
Iroquois Door Company	500
Sanitary Process Equipment Corporation	120
Sawyer Industries, Incorporated	160
Steps and Rails, Incorporated	140
Super Heat Treating, Incorporated	130
Syracuse Pharmacal Company, Incorporated	140
Thomas Foundry, Incorporated	90
Wickhardt Company, Incorporated	140
Total	2,200

Discussion of Wastewater Collection System

The existing major trunk sewers for the Ley Creek and Metropolitan systems are shown on Drawing B-3, along with the locations of those industries sampled. Based on the available information, essentially all of the sanitary and industrial wastewater generated in the Ley Creek Sanitary District is discharged to the collection system. There are a few industries (shown in Table 9) that discharge industrial wastewaters to surface drainage systems; however, all except Clicquot Club Bottling Company discharge at least sanitary wastewaters to a municipal collection system. It is expected that the municipal collection system will be able to handle this additional wastewater flow through the existing facilities. Clicquot Club Bottling Company, however, will require a new sewer lateral to discharge its wastewaters to the municipal system.

Those industries listed in Table 10 should also be connected to the closest municipal collection system as soon as discharge of sanitary wastewater to a septic tank system is no longer adequate or appropriate. Should all of the industrial wastewater presently discharged to surface drainage and all the sanitary wastewater presently discharged to septic tanks be discharged to the collection system, the increase in flow would be less than 2.0 mgd. This projected increase is not expected to change the characteristics of the total wastewater influent to the treatment plants.

5

POTENTIAL TREATMENT ALTERNATIVES

General Considerations

A great number of factors were involved in the determination of the treatment alternatives available for meeting the State's requirements for wastewater discharges in the Ley Creek-Metropolitan area. Numerous combinations of new and existing treatment facilities, treatment methods, effluent discharge points, etc., with varying potentials for accomplishment of the desired objectives were developed and subjected to a preliminary evaluation. The results of this evaluation are shown in Table 11. The principal factors involved were: utilization of the existing Ley Creek and Metropolitan S.T.P. facilities effluent discharge to Ley Creek, Onondaga Lake, and/or the Seneca River; pretreatment by appropriate industries; and the constraints imposed by modifications to the overall sewerage system recently implemented or well along in the planning stage. This preliminary evaluation disclosed that several of the potential treatment alternatives involved obvious economical or technical disadvantages, and therefore, did not warrant further investigation. The remaining alternatives, which did appear to be feasible and consequently worthy of further investigation, furnish the basis for the planning for the laboratory treatability studies and the subsequent process design and cost estimating activities. The following discussions highlight the effects or the involvement of the major factors in the various alternative treatment systems.

Utilization of the Ley Creek Sewage Treatment Plant

With the pump station and force main for transfer of wastewater to the Metropolitan Treatment Plant, it is possible to convert the Ley Creek Sewage Treatment Plant to a pretreatment facility. The heavy concentration of industry in the Ley Creek Sanitary District results in the discharge of highly variable concentrations of organic materials, solids, oil, grease, and heavy metals; any one of these contaminants which could be reduced in a properly designed pretreatment system.

The existing activated sludge treatment facilities at the Ley Creek Treatment Plant are designed to handle normal concentrations of BOD_5, oil and grease, solids, and alkalinity or acidity. Inadequate biological treatment in this plant has been attributed partly to metal toxicity, but the results of the influent sampling survey at this plant did not show concentrations of heavy metals sufficient to cause biological toxicity. If metal toxicity subsequently becomes a problem, extensive modifications of the Ley Creek Treatment Plant would be required, since treatment of significant concentrations of heavy metals generally cannot be accomplished in a biological system.

The existing hydraulically-overloaded primary clarifiers at the Ley Creek Sewage Treatment Plant are equipped to remove floating materials, such as oil and grease; however, at the present time these facilities are manually operated and require considerable maintenance. The plant's capacity to handle suspended solids is limited by the anaerobic digestion and sludge disposal facilities. Removal of contaminants such as oil and grease, inorganic solids, and alkalinity or acidity could be handled in the Ley Creek Plant; however, sewer ordinances (including that of Onondaga County) generally preclude discharge of large quantities of these materials due to potential detrimental effects on the collection system.

Table 11

Summary of
Wastewater Treatment Alternatives

Alternative	Wastewater Treatment at L.C.S.T.P.	L.C.S.T.P. Effluent Destination	Wastewater Treatment at M.S.T.P.	M.S.T.P. Effluent Destination	Positive Factors	Negative Factors	Constraints	Future Consideration
A	Secondary	M.S.T.P.	Secondary[1]	Onondaga Lake	1. Meets N.Y.S. treatment requirement of 85% BOD_5 removal 2. L.C.S.T.P. effluent organic load eliminated from Ley Creek 3. Dilution available in Onondaga Lake much greater than in Ley Creek 4. L.C.S.T.P. effluent will receive tertiary treatment 5. Present M.S.T.P. outfall can be utilized	1. Would require additional facilities at both L.C.S.T.P. and M.S.T.P. 2. Minimum land area available for expansion at L.C.S.T.P. 3. Additional labor force required at both L.C.S.T.P. and M.S.T.P.	1. A pump station and force main to transfer wastewater from the L.C.S.T.P. to the M.S.T.P. has been installed. 2. Tertiary treatment facilities have tentatively been designed at the present M.S.T.P. location.	Yes
B	Secondary	Ley Creek	Secondary	Onondaga Lake	1. Meets N.Y.S. treatment requirement of 85% BOD_5 removal 2. M.S.T.P. need not be designed for L.C.S.T.P. effluent 3. Present outfalls can be utilized	1. Same as Negative Factors 1, 2, and 3 in Alternative A 2. Ley Creek quality would no doubt be unacceptable under low stream flow conditions	Same as Alternative A	No
C	Secondary	Onondaga Lake	Secondary	Onondaga Lake	1. Same as Positive Factors 1, 2, 3 and 5 of Alternative A	1. Same as Negative Factors 1, 2 and 3 in Alternative A 2. New L.C.S.T.P. outfall to Onondaga Lake would be required 3. L.C.S.T.P. effluent would not receive tertiary treatment	Same as Alternative A	No
D	Secondary	Onondaga Lake[2]	Secondary	Onondaga Lake	1. Same as Positive Factors 1, 2, 3 and 5 of Alternative A 2. Secondary facilities at M.S.T.P. need not be designed for L.C.S.T.P. effluent 3. Pump station and force main installed	1. Same as Negative Factors 1, 2, and 3 in Alternative A 2. Nominal 85% BOD_5 removal of organic matter from L.C.S.T.P. influent may not be acceptable 3. L.C.S.T.P. effluent would not receive tertiary treatment	Same as Alternative A	No
E	Partial[3]	M.S.T.P.	Secondary[1]	Onondaga Lake	1. Same as Positive Factors 1 through 5 in Alternative A 2. Minimum expansion and optimum utilization of L.C.S.T.P. facilities	1. Secondary facilities at M.S.T.P. must be designed for additional flow and organic load	Same as Alternative A	Yes
F	None	M.S.T.P.	Secondary[1]	Onondaga Lake	1. Same as Positive Factors 1 through 5 in Alternative A 2. Manpower at L.C.S.T.P. would be available for M.S.T.P. 3. L.C.S.T.P. operating costs eliminated	1. Secondary facilities at M.S.T.P. must be designed for additional flow and organic load 2. L.C.S.T.P. bond issue still outstanding	Same as Alternative A	Yes
G	Secondary[1]	Ley Creek	Primary	L.C.S.T.P.	1. Meets N.Y.S. treatment requirement of 85% BOD_5 removal 2. Uses existing facilities at M.S.T.P.	1. A new pump station and force main would be required. The recently completed facility does not have the required capacity 2. Would require additional facilities and manpower at the L.C.S.T.P. 3. Effluent from the L.C.S.T.P. would probably impair the quality of Ley Creek 4. Adequate land area and sludge disposal site not available at the L.C.S.T.P.	Same as Alternative A	No
H	Secondary[1]	Onondaga Lake[2]	Primary	L.C.S.T.P.	1. Same as Positive Factors 1 through 3 in Alternative A	1. Same as Negative Factors 1, 2 and 4 in Alternative G 2. New L.C.S.T.P. outfall to Onondaga Lake would be required	Same as Alternative A	No

[1] Combined wastewater treatment

[2] Via force main and present M.S.T.P. outfall without additional treatment

The concentrations of organic material in the effluent to the secondary treatment section of the Ley Creek S.T.P. are high and variable. Since this section of the plant is overloaded, it could not be expected to consistently produce an effluent suitable for discharge to surface waters, but it could be used effectively for pretreatment of organic contaminants. The decision concerning the use of the existing Ley Creek S.T.P. for the pretreatment of organics is essentially a matter of economics, i.e. whether it is more economical for the County to treat the total organic load with industry paying a surcharge for contaminant discharges in excess of specified levels, or for the appropriate industries to pretreat to meet these specified sewer discharge requirements. An important factor affecting this decision is the availability of Federal and/or State aid for municipal facilities, but not for private industrial facilities.

Utilization of the Metropolitan Sewage Treatment Plant

As indicated in Table 11, there are a number of options involving the Metropolitan S.T.P. facilities. Many of these options include secondary treatment at the Metropolitan S.T.P. of various combinations of Metropolitan raw wastewater with Ley Creek wastewater already subjected to various degrees of treatment. The force main (and pump station) between the two treatment plants provides flexibility and increases the number of options, but the greater volume of the Metropolitan wastewater and the greater dilution available at the Metropolitan outfall favor transfer from Ley Creek to Metropolitan over transfers in the reverse direction. The tentative selection of the Metropolitan S.T.P. as the location of future tertiary treatment facilities also tends to favor Metropolitan as a terminal rather than an intermediate point for treatment of wastewaters from the two districts.

Industrial Pretreatment

Discharge limits on a number of contaminants have been set forth by Onondaga County in their *Rules and Regulations Governing the Use of Public Sewers*. These restrictions prohibit the discharge of toxic substance in sufficient quantity to interfere with the treatment process. Although no toxic concentrations were observed at either treatment plant, the potential does exist for an occasional high concentration of heavy metal. If metal toxicity does become a problem in the future, the most economical solution would be to eliminate the problem at the source. It would be more reasonable to treat a low volume of a relatively high metal-content wastewater at the source than to treat the high volume (approximately 15 mgd) at the treatment plant. Almost all industries using large amounts of any of the heavy metals have the potential to discharge these materials at toxic concentrations. Therefore, in-plant measures should be taken to minimize the occurrence of accidental toxic discharges. The need for surveillance and related protective measures by individual industries was indicated in the Interim Report.

The first concern of any wastewater system should be the protection of the collection system. Therefore, the discharge of high concentrations of contaminants such as oil, grease, inorganic solids, and extremes of alkalinity or acidity, which will cause problems in the collection system, should be reduced to those concentrations set forth in Onondaga County's Rules and Regulations.

Since the average influent BOD_5 concentration to the Ley Creek Sewage Treatment Plant exceeds the allowable discharge of 300 mg/L, it is logical to assume that at least one industry is exceeding its discharge limit. During the ROY F. WESTON survey, samples were collected at selected industries that were felt to contain high organic concentrations or other contaminants that could cause a potential problem in a biological treatment plant. The survey indicated the four industries were discharging mean BOD_5 concentrations in excess of 300 mg/L. These industries are listed in Table 12. It is interesting to note that of those four industries exceeding the limit, practically all of the excess BOD_5 (approximately 25,000 lbs/day) accounted for originates from Bristol Laboratories. It should be stated, however, that the Onondaga County Sewer Regulations provide that organic concentrations higher than the limit of 300 mg/L BOD_5 may be discharged upon approval by the County.

Table 12

Organic Discharges Exceeding Allowable Limits

Industry	Mean Flow gpd	Mean BOD_5	Allowable BOD_5[1]	Excess BOD lbs/day
Bristol Laboratories	1,890,000	29,085 lbs/day	4,740 lbs/day	24,345
Corenco	131,000	575 mg/L	300 mg/L	300
Crispy Maid	8,000	59 lbs/day	24 lbs/day	35
Ralph Packing Company	40,000	325 lbs/day	100 lbs/day	225
Total				24,905

[1] Allowable BOD_5 discharge is 300 mg/L.

Summary of Potential Treatment Alternatives

A summary of potential treatment alternatives was shown in Table 11. Not all of the potential alternatives received serious consideration because of pre-imposed constraints or obvious economical or technical disadvantages. Those alternatives justifying further consideration and investigated in laboratory treatability studies were secondary treatment, partial or pretreatment, and no treatment of the Ley Creek Treatment Plant influent wastewater, followed by secondary treatment of these three different Ley Creek effluent wastewaters in combination with the Metropolitan wastewaters.

6

PROCESS INVESTIGATION

General Planning Considerations

Since practically all major industries in the area are connected to the municipal sewerage systems, the influent wastewaters to the Ley Creek and Metropolitan Sewage Treatment Plants are the major concern in this process investigation. Industrial wastewater pretreatment methods require attention only to the extent that specific discharges would affect either the municipal collection system or the surface waters.

The low metal concentrations and relatively high organic concentrations observed in the survey of the treatment plant influent wastewaters indicated that organic loading is the major pollutant characteristic which will require treatment. Experience has shown the activated sludge process to be an economical, flexible, and dependable method for reducing the organic content of wastewaters. Various alternative treatment systems, based on the preliminary evaluation of the potential treatment alternatives discussed in the previous section, were investigated in the laboratory. Table 13 identifies three alternative systems (and the major components of two of them) by code numbers which will be used in this report for laboratory treatability systems and subsequently for the corresponding process design and cost estimate discussions.

Table 13

Identification of Alternative Treatment Systems

System Number	Treatment Involved
1-A	Secondary treatment of Ley Creek S.T.P. influent
1-B	Secondary treatment of the combination of clarified Ley Creek S.T.P. secondary effluent and the raw wastewater influent to the Metropolitan S.T.P.
2	Secondary treatment of the combined Ley Creek and Metropolitan raw wastewaters
3-A	Partial treatment (Plain Aeration) of Ley Creek S.T.P. influent
3-B	Secondary treatment of the combination of the clarified effluent from the Ley Creek Plain Aeration system and raw wastewater influent to the Metropolitan S.T.P.

Laboratory investigations were planned to obtain the essential design parameters required for plain aeration, conventional activated sludge, and the contact-stabilization modification of the activated sludge process. Complementary studies of filtration were included to determine the extent of BOD associated with the solids in the wastewaters and to indicate the applicability of biofloccuation or initial contact removal.

The plain aeration system was operated in a complete-mix reactor over a range of hydraulic loadings while the influent and clarified effluent organic concentrations were being measured. There was no sludge recycle, and no batch test was performed on this system.

The other laboratory programs included operation of continuous-feed activated sludge systems over a wide range of loadings to generate operating data and develop acclimated biological sludges. The acclimated sludges developed in this manner were used in performing a "Tube Run", which is a batch test used to develop process parameters, such as BOD removal rate kinetics, oxygen requirements, sludge production rates, and loading characteristics. The acclimated sludge from two pre-selected systems (1-A and 2) remaining after the Tube Runs, was used to start a pilot-scale contact-stabilization system on each of the selected wastewaters. Additional tests were conducted to determine the oxygen transfer and saturation characteristics, and the activated sludge settling and compaction requirements. The results of the investigations are the basis of the process design parameters.

A schematic flow diagram of various laboratory-scale activated sludge treatability systems is shown in Drawing B-4; the contact-stabilization pilot units operated on Systems 1-A and 2 are shown in Drawing B-5.

Wastewaters used in the biological treatability studies were daily composite (but not flow-proportioned) samples of the influent flow at the Ley Creek and Metropolitan Sewage TReatment Plants. Suspended solids in these wastewater samples were kept in suspension during operation of the laboratory system, because at the time these studies were initiated, discussions with Onondaga County indicated that primary clarifiers would not be included in any plant design.

Investigative Program and Results

Industrial Pretreatment

The only industrial wastewater situation where a pretreatment investigation was considered significant was at Crouse-Hinds, which was discharging directly to a small drainage ditch flowing into Ley Creek. A brief treatability study was conducted at the Crouse-Hinds plant for oil removal. STS (Susceptibility to Separation) tests were conducted on two grab samples taken from an oily sewer. In the STS test, the concentration of oil (Carbon Tetrachloride Extractables) is determined in the wastewater at the start of the test and in the subnatant liquid after 30 minutes quiescent settling. the results of these tests are shown below:

Date	Time	Sample	Oil, mg/L
11/19/68	1130	Raw	287
	1200	Subnatant	38.6
11/19/68	1415	Raw	150
	1445	Subnatant	25.0

These preliminary results indicate that the subnatant oil concentration can be reduced to acceptable levels in a properly designed gravity separation system.

Filtration Studies

The filtration studies for investigation of the association of organics with suspended solids and of the applicability of bioflocculation were conducted on random samples of the influent to the Ley Creek Sewage Treatment Plant. Ten grab samples were taken and filtered through No. 4 Whatman paper to remove the suspended solids. Data collected during this experiment, shown in Table 14, indicate that suspended solids removal resulted in an average COD reduction of 56.2 percent. However, in a full-scale plant even under ideal conditions and with optimum polymer (or inorganic chemical) dosage, the degree of removal expected would be less than that obtained in the laboratory tests.

Table 14

Comparison of Raw and Filtered Wastewater Samples
Ley Creek S.T.P. Influent

Date	Time	Raw Wastewater SS mg/L	Raw Wastewater VSS mg/L	Raw Wastewater COD mg/L	Filtered Wastewater COD mg/L	COD Removal Percent
8/21/69	0200	594	394	700	280	60.0
8/21/69	0600	384	224	680	360	47.1
8/21/69	1200	772	428	800	360	55.0
8/21/69	1600	908	564	1,320	660	50.0
8/21/69	2200	1,332	984	1,540	760	50.7
8/22/69	0400	354	138	920	480	47.8
8/22/69	0900	1,652	556	1,360	840	38.2
8/22/69	1400	472	148	828	374	54.8
8/22/69	1900	1,596	772	1,258	278	78.0
8/22/69	2400	3,212	384	1,236	238	80.6
Average						56.2

Biological Treatability

General Discussion - Laboratory investigation of the biological treatability of regular domestic sewage generally is not justified. However, the Ley Creek S.T.P. influent wastewater (or any combined wastewater stream which includes the LCSTP wastewater) contains enough industrial wastewater to affect significantly the organic-removal rates and other parameters involved in development of a sound process design. The following sections cover the general principles of interpretation of the activated sludge process and the design information developed from the various laboratory studies.

The reactions occurring in an aerobic biological system, although complex, are based on fundamental reactions. Biodegradable organic matter is consumed by the micro-organisms which comprise the activated sludge mass. In the process of assimilating the organic matter, a fraction of the organic waste material is biochemically oxidized to obtain energy necessary for motility, growth, and cell maintenance. After the organic food material is removed from solution into the biological mass, it must be "stabilized". Stabilization involves conversion of all food material into energy and new-cell synthesis reactions. Energy to support synthesis comes from oxidation of a portion of the available food supply and conversion to CO_2, water, and other stable, innocuous end-products. Throughout these assimilation reactions, the biomass undergoes a basal metabolism reaction called endogenous respiration.

In the activated sludge treatment of some wastewaters which are readily biodegradable, the stabilization reactions occur almost as rapidly as the transfer of BOD to the organisms. However, when a wastewater contains several or many complex organic compounds which are not rapidly degraded, BOD transfer can occur at a much faster rate than stabilization. The rate of stabilization relative to the rate of BOD transfer is a primary factor in designing an activated sludge system. When the two rates are nearly equal, the "conventional" approach is applicable. When stabilization occurs at a slower rate than BOD transfer, the "contact-stabilization" (BOD transfer and stabilization accomplished in separate facilities) approach may be beneficial in minimizing aeration basin volume requirements.

Nutrient Requirements - A proper balance of nutrients is necessary to develop and maintain a healthy biological population. The two most important nutrient materials are nitrogen and phosphorus. Generally, five pounds of nitrogen and one pound of phosphorus are required for every 100 pounds of BOD_5 removed. Other nutrients, required by activated sludge in trace amounts, are normally present in most wastewaters.

From the influent surveys conducted on both wastewaters, it was apparent that adequate phosphorus was present in the wastewaters however, on occasion there was not enough nitrogen (as ammonia) in the Ley Creek wastewater for the expected amount of BOD_5 removal. Therefore, in the laboratory treatability investigations, nitrogen was added, regardless of the amount initially present in the wastewater, to make sure that the nutrient supply was adequate for proper growth of the biological organisms.

BOD Removal Kinetics - The rate of removal of BOD from the influent wastewater is an essential factor in the design of an activated sludge treatment facility. The development of BOD removal kinetics by evaluation of individual reactions is impractical, because of the complexity of the biological system. Therefore, the evaluation of the removal kinetics has been approached on a simplified overall basis.

A laboratory-scale technique reported by Weston and Stack[1] was used to develop the fundamental information about the progress of biological oxidation kinetics. The technique involves the growth and acclimation of an activated sludge system in a continuous-flow,

[1] *Prediction of the Performance of Completely-Mixed Continuous Biological Systems from Batch Data, R. F. Weston and V. T. Stack, Conference on Biological Waste Treatment, Manhattan College, April 20-22, 1960.*

laboratory-scale unit, and the use of the biological sludge in a batch test, called a "Tube Run". During the acclimation period, composite wastewater samples are fed to the continuous-flow unit, with daily measurement of the operational parameters. The activated sludge, after acclimation to the particular wastewater in the continuous-flow system, is harvested, concentrated by settling, and used in the Tube Run procedure. The Tube Run study consists of operating four batch systems (tubes) in which the BOD_5-to-biological-solids (VSS) ratio is varied over a range observed in the operation of the continuous-flow systems. By observing the rate of BOD removal, COD removal, and oxygen consumption, the kinetics of biological treatment for the particular wastewater are developed.

The theoretical interpretations applied to the batch tube run data include the following steps:

1. Calculation of BOD and COD transfer coefficients for each activated sludge mixture in the tube run study.

2. Correlation of the transfer coefficients with the corresponding loading, as food-to-organism ratios.

3. Translation of the batch kinetics to a prediction of the performance of a completely-mixed, continuous-feed system utilizing a "completion of reaction" curve. The curve is calculated from the proper BOD or COD transfer data and from a pre-defined mixing theory relationship.

Operating data from the plain aeration, conventional activated sludge, and contact-stabilization systems are presented in Tables A-9 through A-15. Tube run data from Systems 1-A, 1-B, 2, and 3-B are presented in Drawings B-6 through B-9, respectively.

The kinetics, interpreted from the tube run procedure and from the daily operating data from the continuous laboratory or pilot units, form the basis for the prediction of performance of a full-scale activated sludge facility and for selection of the conventional process or the contact-stabilization modification. Graphical representations of the BOD removal kinetics vs organic loading ratio (i.e. the concentration of organics in the influent to the concentration of volatile suspended solids in the aerated mixed liquor) for Systems 1-A, 1-B, 2, and 3-B are presented in Drawings B-10 through B-13, respectively. Interpretation of the stabilization kinetics of the contact-stabilization pilot unit has not been included in these drawings. These data indicate conventional activated sludge for System 1-A, and the contact-stabilization modification for Systems 1-B and 3-B. System 2, which was operated in the laboratory without primary solids removal, would appear to call for conventional activated sludge; however, if primary solids are removed, it is expected that the kinetics would shift to favor contact-stabilization. Since primary solids removal is now anticipated in the eventual full-scale system, contact-stabilization kinetics were derived for System 2. The following tabulation is a summary of the BOD removal kinetics for the various systems:

System No.	Removal Rate,* $Hours^{-1}$ Overall	Contact	Stabilization
1-A	1.6	-----	-------
1-B	-----	1.8	0.55
2	-----	1.1	0.45
3-B	-----	3.7	1.3

*at $20^{\circ} \pm 2^{\circ}C$.

The plain aeration system for the Ley Creek influent wastewater (System 3-A) was interpreted in a different manner than the other systems. It was operated on a homogeneous raw wastewater, which was fed to a complete-mix aeration system varied to give a range of detention times; the overflow was clarified before discharge. There was no solids recycle, and the mixed liquor had a low concentration of solids. Drawing B-14 shows the percent BOD removal efficiency obtained with various aeration detention times. The average BOD removal by clarification along, without aeration, was approximately 30 percent.

Oxygen Requirements - Oxygen is consumed by the activated sludge in the energy reactions which support synthesis of organic materials into new cell material and in endogenous respiration or autooxidation (self-destruction) of cell material. The requirements for energy and endogenous oxygen can be predicted from the oxygen consumption observed in the batch tube run system. Energy oxygen requirements are usually stated in terms of pounds of oxygen consumed per pound of BOD_5 removed, while the endogenous oxygen requirements are stated in pounds of oxygen per 1,000 pounds of VSS under aeration per hour. Oxygen requirement data obtained from the continuous systems were comparable to the oxygen requirements measured in the batch system.

The following is a summary of the oxygen requirements measured both on the Tube Run systems and on the continuous flow units:

System No.	Energy Oxygen lbs. O_2/lb. BOD_5 removed	Endogenous Oxygen lbs. O_2/1,000 lbs. VSS/hr.
1-A	1.0	6.9
1-B	0.9	13.0
2	0.85	11.6
3-B	0.9	9.5

Oxygen Transfer - The sizing of aeration equipment for the transfer of required amounts of oxygen into the aeration mixture requires an understanding of the interfacial resistances to oxygen transfer. Aeration equipment manufacturers generally base the performance of equipment on the rate of oxygen transfer into tap water under "standard conditions", Therefore, resistances to oxygen transfer into the activated sludge aeration mixture must be compared to the corresponding resistances for tap water to assure the selection of adequately sized equipment. This relationship is called the alpha (α) value, and is defined as the oxygen transfer coefficient of the wastewater divided by the oxygen transfer coefficient of tap water.

Another important ratio is the beta factor (β), which accounts for the difference in DO saturation levels between activated sludge mixed liquor and tap water.

The alpha and beta factors calculated on the activated sludge grown in the four continuous-unit systems did not vary greatly.

System No.	Alpha	Beta
1-A	0.66	0.94
1-B	0.68	0.93
2	0.77	0.91
3-B	0.70	0.95

Production of Excess Activated Sludge - The activated sludge system normally produces an excess of biological solids, which are the result of the synthesis of soluble organic material to insoluble bacterial protoplasm and of the inclusion of inorganic and organic insoluble solids into the biological mass.

The amount of sludge synthesis can be estimated by several methods from the operation of the laboratory units. The theoretical approach consists of comparing the oxygen requirements and the BOD and COD removal data with a predetermined sludge production coefficient. The monitoring of actual production rates is the second approach to estimating excess activated sludge quantities.

The rate of sludge synthesis was calculated from relationships that combine the theoretical approach and actual data. The gross sludge production rate calculated from both the Tube Run data and the continuous flow systems are presented below.

System No.	Gross Sludge Production[1] lbs. VSS/ lb. BOD_5 removed
1-A	1.0
1-B	0.9
2	1.2
3-B	1.0

[1] At 20° ± 2°C.

Sludge Settling Characteristics - During the operation of the laboratory continuous-flow and batch systems, gravity settling tests were conducted on mixed liquor to determine the subsidence rate of the activated sludge solids. These observed data were analyzed to determine the practical settling rate for designing secondary clarifiers. In addition, the settled solids concentration was estimated for the purpose of approximating clarifier activated sludge recycle flows and concentrations.

The clarifier overlfow rates and the corresponding underflow solid concentrations for the various activated sludge systems are shown below:

System No.	Overflow Rates, gal/day/sq.ft.	Underflow Solids Concentration mg/L
1-A	600	17,000
1-B	800	13,000
2	650	14,000
3-B	500	10,000

Gravity Thickening - Additional settling tests were conducted to evaluate the compaction characteristics of the excess activated sludge solids. Interpretations of the data obtained in the thickening studies indicate the following mass (solids) loadings and underflow solids concentrations for the individual systems:

System No.	Overflow Rates lbs/day/sq.ft.	Underflow Solids Concentration mg/L
1-A	40	30,000
1-B	23	28,000
2	25	25,000
3-B	16	19,000

Summary of Investigative Results

The design parameters for the optimum activated sludge modification as determined from laboratory treatability investigations on the individual systems are summarized in Table 15.

Table 15

Summary of Observed Laboratory Results

	System 1 A	System 1 B	System 2	System 3 B
	Secondary treatment of Ley Creek S.T.P. influent	Secondary treatment of Ley Creek S.T.P. secondary effluent and Metropolitan S.T.P. influent	Secondary treatment of the combined Ley Creek and Metropolitan raw wastewaters	Secondary treatment of Ley Creek Plain Aeration effluent and Metropolitan S.T.P. influent
Design BOD_5 Removal Kinetics				
Total Kinetics[1]	1.6 hours [1]	0.55 hours [1]	0.45 hours [1]	1.3 hours [1]
Contact Kinetics		1.8 hours [1]	[illegible] 1 hours [1]	3.7 hours [1]
Oxygen Requirements				
Energy, lbs O_2/lb. BOD_5 removed	1.0	0.9	0.85	0.9
Endogeneous, lbs O_2/hr./1000 lbs. MLVSS	6.9	13.0	11.6	9.5
Oxygen Transfer Coefficient,	0.66	0.68	0.77	0.7
Oxygen Saturation in Wastewater,	0.94	0.93	0.91	0.95
Temperature of test, °C	23	18	21	18
Laboratory Sludge Settling Rate				
Clarifier Overflow Rate, gpd/sq.ft.	600	800	650	500
Underflow Concentration, mg/L	17,000	13,000	14,000	10,000
Thickener Loading, ppd/sq.ft.	40	23	25	16
Min. Underflow Concentration, mg/L	30,000	28,000	25,000	19,000
Gross Sludge Production[2], lbs/lb. BOD_5 removed	1.0	0.9	1.2	1.0
Sludge Destruction Rate[2], % VSS/day	3.0	10.0	7.0	4.0

[1] Stabilization kinetics in Contact Stabilization system or overall kinetics in Conventional Activated Sludge system

[2] At 20 ± 2°C

Note Results for System No. 3 A (Partial treatment Plain Aeration of Ley Creek S.T.P. influent) shown in Drawing No. B 14

7

PROCESS DESIGN

General Basis of Design

The principal consideration or objective in the development of the process design was to establish a sound base for preliminary estimates of the capital and total annual costs of the several treatment alternatives considered technically feasible. Since these estimates would then be used for comparison and selection purposes, certain elements were excluded from the process design, such as the existing collection systems, the pump station and force main between Ley Creek S.T.P. and Metropolitan S.T.P., the existing pumping stations and grit chambers at both treatment plants, and sludge digestion and disposal facilities. The principal types of treatment operations considered are primary clarification, activated sludge, final clarification, and sludge thickening.

The factors which constitute the basis for process design are as follows:

1. The treatability parameters established by the laboratory process investigations and related discussions, particularly the 50 percent probabilities of occurrence of projected daily dry-weather flow and BOD_5 loading. (For the design of certain facilities where peak loadings would affect performance, the 90 percent probabilities of occurrence values are relevant.)

2. The requirement of 85 percent BOD_5 removal (30 consecutive-day average) under cold-temperature conditions (10°C).

3. A minimum of primary clarification for all wastewaters, including excess stormwater.

Since the studies were conducted with a mixed wastewater feed and the present design includes the installation of primary clarifiers, it is anticipated that the removal of the settleable solids will have an effect on the removal kinetics. Therefore, the treatability parameters established during the laboratory-scale investigations have been adjusted to reflect this change in removal rate kinetics.

Removal rate kinetics are affected by the operating temperature. Since cold-temperature operation is not critical for the biological treatment process, the kinetics were adjusted for ambient-air operating temperature of 10°C.

Design of the hydraulic capacity for a combined treatment plant under maximum storm flow conditions has been established by Onondaga County's consultants in prior studies. It has been estimated that the maximum capacity of the various collection systems entering the plant will be 215 mgd. These collection systems are combined wastewater and stormwater systems.

Excess stormwater flow has been excluded from consideration for treatment at the Ley Creek S.T.P. because in each of the feasible treatment alternatives all the LCSTP wastewater would be transferred to the Metropolitan S.T.P. for some kind of additional treatment. During heavy stormwater flow conditions, the wastewater influent to the Metropolitan S.T.P. will, according to Onondaga County's consultants, enter a diversion chamber ahead of the primary clarifiers. This diversion chamber will bypass that volume of wastewater in excess of the MSTP design capacity around the primary clarifiers to a second diversion chamber. This second chamber will be designed so that all the wastewater that has bypassed primary clarification will be routed to the activated sludge tank, while a like volume of primary-treated wastewater will be discharged directly to chlorination facilities and thence to the final effluent line.

At the present time there are six primary clarifiers at the Metropolitan S.T.P., but Onondaga County's consultants have indicated that these clarifiers should be used in the tertiary treatment system currently under consideration. Therefore, new primary clarifiers would be required for the biological treatment system.

The type of construction to be employed in the treatment facilities will depend on a number of conditions, such as available land area, subsurface conditions, cost, and other related factors which ROY F. WESTON was not in a position to investigate fully. Onondaga County's consultants have investigated these conditions for this particular location, and their proposed vertical, common-wall, concrete tank design will be used for construction.

Since additional raw wastewater pumping should not be required in any of the various proposed biological treatment systems, pump facilities are not included in the designs.

Wastewater from the two treatment plants was found to have phosphorus concentrations adequate for biological treatment. Wastewater at the Ley Creek Sewage Treatment Plant was occasionally deficient in nitrogen, but there should be adequate nitrogen for the expected BOD concentrations for all alternatives except activated sludge treatment of the Ley Creek influent wastewater. Nitrogen storage and feed facilities therefore will be included only in the design of this system.

Development of Process Designs for the Alternative Treatment Systems

In the following sections the facilities to be included in each of the technically feasible treatment systems are discussed in light of the rationale presented in the General Basis of Design section.

Secondary Treatment of Ley Creek S.T.P. Influent

From the laboratory treatability data, conventional activated sludge appeared to be more advantageous than the contact-stabilization modification. The existing LCSTP pump station, grit chamber, and primary clarifiers would be suitable for use in the proposed system. Since the primary clarifiers are overloaded, the suspended solids removal should be minimal, and the BOD removal rate coefficient would probably not vary from that observed in the laboratory studies, which were conducted on wastewater feed from which the solids had not been removed. The existing LCSTP aeration basins and final clarifiers would require modifications of such an extent as to rule out their use in the proposed system. To summarize, the treatment plant design for this alternative includes two new complete-mix activated sludge tanks, three new final clarifiers, a new sludge thickener, and pumps and other auxiliary equipment. No stormwater would be treated at Ley Creek S.T.P., because LCSTP is not equipped to handle stormwater and because the overall treatment system calls for pumping of the wastewater to Metropolitan S.T.P. for further treatment.

Secondary Treatment of LCSTP Effluent and MSTP Influent

The contact-stabilization modification of activated sludge was indicated as the most advantageous method for this particular wastewater. The pump station and force main for transporting wastewater from the Ley Creek Plant to the Metropolitan Plant and the existing grit chamber and pump station at the Metropolitan Treatment Plant are considered to be adequate. The new facilities required would therefore include new primary clarifiers and pumps, contact and stabilization tanks, final clarifiers and pumps, and sludge thickeners and pumps.

Secondary Treatment of Combined LCSTP and MSTP Influents

The treatability data for the unsettled wastes indicated conventional activated sludge to be the optimum biological treatment system. However, with primary clarification, the solids removal should change the kinetics so that contact-stabilization would be preferable to the conventional system. Therefore, the new facilities required for the system would include primary clarifiers, contact and stabilization tanks, final clarifiers, sludge thickeners, and pumps and other auxiliary equipment.

Plain Aeration of LCSTP Influent

The plain aeration system for the Ley Creek wastewater would use the existing treatment plant, with modifications. Minimal modifications to the existing plant have already been made under a recent contract. Additional modifications could be made to this plant to improve performance, but no such additional modifications have been incorporated into the design of this system.

Secondary Treatment of LCSTP Plain-Aeration Effluent and MSTP Influent

The process design for this system would use the contact-stabilization process. The existing grit chambers and pump station at the Metropolitan Sewage Plant could be utilized; new primary clarifiers, contact and stabilization tanks, final clarifiers, sludge thickeners, and pumps and other auxiliary equipment are included in the process design.

Summary of Design Basis and Major Unit Sizes

The unit tank sizes, aeration requirements, and estimates of sludge production determined from the process design and the treatability investigations are summarized in Table No. 16.

Table 16

Summary of Unit Sizes for Various Treatment Alternatives

	System 1		System 2	System 3	
	1 A	1 B		3 A	3 B
DESIGN BASIS					
Flow, MGD	18.5	69.0	69.0	18.5	69.0
BOD, lbs/day	53,500	55,100	100,600	53,500	73,850
(BOD, lbs/day for aerator design)	78,600	96,100	166,600	78,600	127,350
Max. Stormwater Flow, MGD		215	215		215
PRIMARY CLARIFIERS	Use existing tanks			Use existing tanks	
Design Overflow Rate, gpd/sq.ft		650[1]	650[1]		650[1]
Total Area Required, sq.ft.		106,000	106,000		106,000
Pump Capacity each, MGD		50	50		50
AERATION BASINS				Use existing tanks	
Contact Tanks	None				
Total Volume, 10^6 gallons		12.45	12.55		6.85
Oxygen Transfer, lbs/hr.		3,500	4,060		3,500
Aerators		20 at 100 HP	20 at 100 HP		16 at 100 HP
Stabilization Tanks	None				
Total Volume, 10^6 gallons		5.75	4.9		5.6
Oxygen Transfer, lbs/hr		2,500	2,190		2,500
Aerators		16 at 90 HP	12 at 90 HP		12 at 100 HP
Conventional Activated Sludge Tanks		None	None		None
Total Volume, 10^6 gallons	4.3				
Oxygen Transfer, lbs/hr.	3,500				
Aerators	20 at 90 HP				
FINAL CLARIFIERS				Use existing tanks (or convert to aeration tanks)	
Design Overflow Rates, gpd/sq.ft	600	800	650		700
Total Area Required, sq.ft	30,900	86,300	106,000		98,600
Recycle Pump Capacity each, MGD	20	70	70		70
SLUDGE THICKENERS				None	
Sludge Produced, lbs/day	75,000	76,800	133,000		101,200
Total Area Required, sq.ft	1,900	3,400	6,860		5,300
Pump Capacity each, MGD	0.5	1.25	1.25		1.25

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[1] Overflow Rate approximately 1,370 gpd/sq.ft. at peak storm flow conditions.

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COST ESTIMATES

Preliminary estimates of capital and total annual (including both fixed and operating) costs for the various treatment alternatives are presented in Tables 17 and 18. Table 17 covers the capital and annual costs for the three overall alternative systems on the basis of the projected BOD_5 loading. Table 18 covers the costs for the same systems on the basis of a reduced BOD_5 loading; this reduced loading represents the effect of the estimated 25,000 lbs/day of BOD_5 that would be kept out of the municipal system if Bristol Laboratories pretreated its wastewater to produce an effluent in compliance with the sewer discharge limit of 300 mg/L.

Amortization costs of existing treatment facilities at the Ley Creek and Metropolitan Sewage Treatment Plants have been excluded from the calculation of fixed annual costs. In like manner, the fixed and operating costs do not include costs associated with the collection systems, the pump station and force main, the proposed tertiary treatment system, or sludge digestion and disposal.

Table 17

Preliminary Cost Estimate
Wastewater Treatment Facilities

Onondaga County
Syracuse, New York

SUMMARY OF CAPITAL COSTS AT PROJECTED BOD LOADING

	System 1		System 2	System 3	
	1 A	1 B		3 A	3 B
Primary Clarifiers pumps and mechanisms		$ 4,170,000	$ 3,930,000		$ 4,270,000
Contact Tanks with aerators	$2,410,000[1]	5,900,000	6,080,000		3,530,000
Stabilization Tanks with aerators		2,895,000	2,450,000		2,870,000
Secondary Clarifiers pumps and mechanisms	1,044,000	3,205,000	3,990,000		4,010,000
Thickeners and Pumps	69,000	324,000	247,000		168,000
Sub Total	$3,523,000	$16,494,000	$16,697,000		$14,848,000
Piping at 15%	529,000	2,470,000	2,500,000		2,230,000
Electrical at 12%	424,000	1,980,000	2,000,000		1,782,000
Instrumentation at 8%	282,000	1,320,000	1,335,000		1,188,000
Site Work at 1%	35,200	165,000	167,000		148,500
Sub Total	$4,793,200	$22,429,000	$22,699,000		$20,196,500
Construction Contingency at 15%	718,000	3,380,000	3,410,000		3,030,000
TOTAL CAPITAL COST[2]/PLANT	$5,511,200	$25,809,000	$26,109,000	No additional costs	$23,226,500
TOTAL CAPITAL COST[2]/SYSTEM	$31,320,000		$26,109,000	$23,226,000	

SUMMARY OF ANNUAL COSTS AT PROJECTED BOD LOADING

	System 1		System 2	System 3	
	1 A	1 B		3 A	3 B
Operating Costs for Biological Treatment Units					
Labor					
number of man hours/day	296	488	536	272	488
cost at $5.00/man hour, 365 days/yr.	$ 540,000	$ 890,000	$ 978,000	$496,000	$ 890,000
Maintenance					
Mechanical at 6%	46,100	179,500	213,000	100,000[3]	175,000
Structural at 1%	31,400	150,000	146,700		133,000
Piping and Electrical at 2.5%	23,800	111,200	112,500		100,500
Utilities					
number of HP hr.	1,400	2,400	3,000	400	2,400
cost at $0.012/KWH	109,000	188,000	235,000	31,100	188,000
Total Annual Operating Costs	$ 750,800	$ 1,518,700	$ 1,685,200	$627,100	$ 1,486,500
Fixed Costs for Biological Treatment Units					
Amortization Cost at 5%, 30 years, 20% coverage	374,000	1,750,000	1,770,000		1,575,000
TOTAL ANNUAL COST/PLANT	$1,138,800	$ 3,268,700	$ 3,455,200	$627,100	$ 3,061,500
TOTAL ANNUAL COST/SYSTEM	$ 4,407,500		$ 3,455,200	$ 3,688,600	

[1] Conventional Activated Sludge
[2] Engineering Design Fee not included
[3] Estimate

Table 18

Preliminary Cost Estimate
Wastewater Treatment Facilities

Onondaga County
Syracuse, New York

SUMMARY OF CAPITAL COSTS AT REDUCED[1] BOD LOADING

	System 1		System 2	System 3	
	1 A	1 B		3 A	3 B
Primary Clarifiers pumps and mechanisms		$ 4,170,000	$ 3,930,000		$ 4,270,000
Contact Tanks with aerators	$1,493,000[2]	5,900,000	6,030,000		3,530,000
Stabilization Tanks with aerators		2,895,000	2,450,000		2,870,000
Secondary Clarifiers pumps and mechanisms	1,044,000	3,205,000	3,990,000		4,010,000
Thickeners and Pumps	69,000	324,000	247,000		168,000
Sub Total	$2,606,000	$16,494,000	$16,647,000		$14,848,000
Piping at 15%	391,000	2,470,000	2,500,000		2,230,000
Electrical at 12%	313,000	1,980,000	2,000,000		1,782,000
Instrumentation at 8%	208,000	1,320,000	1,330,000		1,188,000
Site Work at 1%	26,000	165,000	166,000		148,000
Sub Total	$3,544,000	$22,429,000	$22,643,000		$20,196,000
Construction Contingency at 15%	532,000	3,380,000	3,400,000		3,030,000
TOTAL CAPITAL COST[3]/PLANT	$4,076,000	$25,809,000	$26,043,000	No additional costs	$23,226,000
TOTAL CAPITAL COST[3]/SYSTEM	$29,885,000		$26,043,000	$23,226,000	

SUMMARY OF ANNUAL COSTS AT REDUCED BOD LOADING

	System 1		System 2	System 3	
	1 A	1 B		3 A	3 B
Operating Costs for Biological Treatment Units					
Labor					
number of man-hours/day	296	488	536	272	488
cost at $5.00/man-hour, 365 days/yr.	$ 540,000	$ 890,000	$ 978,000	$496,000	$ 890,000
Maintenance					
Mechanical at 6%	30,400	179,500	210,000	100,000[4]	175,000
Structural at 1%	22,900	150,000	146,700		133,000
Piping and Electrical at 2.5%	17,600	111,200	112,500		100,500
Utilities					
number of HP hr.	890	2,400	2,865	320	2,400
cost at $0.012/KWH	69,600	188,000	224,500	24,900	188,000
Total Annual Operating Costs	680,500	1,518,700	1,671,700	620,900	1,486,500
Fixed Costs for Biological Treatment Units					
Amortization Cost at 5%, 30 years, 20% coverage	277,000	1,750,000	1,768,000		1,575,000
TOTAL ANNUAL COST/PLANT	$ 957,500	$ 3,268,700	$ 3,439,700	$620,900	$ 3,061,500
TOTAL ANNUAL COST/SYSTEM	$ 4,226,200		$ 3,439,700	$ 3,682,400	
Annual Savings at Reduced BOD Load	$ 181,300		$ 15,500	$ 6,200	

[1] BOD Load on LCSTP reduced by 25,000 lbs/day.
[2] Conventional Activated Sludge.
[3] Engineering Design Fee not included.
[4] Estimate.

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SELECTION OF TREATMENT SYSTEM

As shown in the Cost Estimate tables, three total system alternatives were compared to determine which one was most advantageous. System 1 includes secondary treatment of the Ley Creek S.T.P. influent wastewater (1-A), followed by secondary treatment of the combination of that effluent and the raw wastewater influent to the Metropolitan S.T.P. (1-B). System 2 is secondary treatment of the combined Ley Creek and Metropolitan S.T.P. raw wastewaters. System 3 is another two-part system, which includes Plain Aeration of the Ley Creek S.T.P. influent (3-A), followed by secondary treatment of that effluent and the raw wastewater influent to the Metropolitan S.T.P. (3-B).

The total annual costs, based on the design at either the projected or the reduced BOD load, indicate that System 2, which combines the two raw wastewaters in a contact-stabilization process, will cost considerably less per year than either System 1 or System 3. Although amortization costs for existing treatment facilities have not been included in these calculations, it is evident that their inclusion would not change the cost relationships between the alternative treatment systems.

Further advantage for System 2 is recognized by considering that the present treatment plants are understaffed due to a lack of qualified manpower. The operation of the proposed secondary and tertiary treatment systems at the Metropolitan Treatment Plant would require additional manpower. Therefore, phasing out the Ley Creek S.T.P. in the near future should not only reduce the total annual costs but should also provide a good source of manpower for the additional operations at the Metropolitan Sewage Treatment Plant.

The total annual cost savings achieved by the reduced BOD_5 loading are not significant. If industry should be required to pretreat its wastewaters to achieve this reduced loading, industry would spend considerably more than the indicated savings to the municipal system. This appears to be adequate justification for Onondaga County to accept the high industrial BOD loads provided that the affected industries pay an equitable share of the treatment costs.

Onondaga County should secure commitments from the industries which contribute a significant portion of the flow and/or organic load regarding their intentions about future wastewater discharge. This will increase the likelihood that adequate capacity for expansion will be designed into the treatment facilities, and that industry will utilize the capacity reserved for them in the proposed expansion. These commitments should be obtained before the County begins detailed design of the proposed facilities.

System 2, secondary treatment of the combined raw wastewaters influent to the Ley Creek and Metropolitan Sewage Treatment Plants, is recommended for installation by Onondaga County, because it will achieve the desired wastewater effluent at a more reasonable cost than any of the other available alternative systems. A preliminary flow diagram and tentative plot plan for this system are shown on Drawings B-15 and B-16, respectively.

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SUMMARY

This evaluation of joint municipal-industrial wastewater treatment is part of a comprehensive continuing series of studies of environmental conditions in and around Onondaga Lake. The general objectives of the overall program are to reduce the pollution load on Onondaga Lake and its tributaties and to develop a good foundation for meeting the anticipated stricter water quality regulations and their consequently increased treatment requirements.

The present study originated as a determination of the status of industrial wastewater discharged in the Ley Creek drainage area and development of a master plan of wastewater collection and treatment for this area. Subsequent developments, particularly other aspects of the overall pollution abatement program, resulted in expansion of this study to cover certain considerations of the Metropolitan Sanitary District wastewater and treatment plant facilities.

After an extensive biological treatment pilot unit program at the Ley Creek S.T.P. failed to produce an effluent acceptable for year-round discharge to Ley Creek, Onondaga County shifted its attention to investigation of the feasibility of transferring the LCSTP-treated wastewater to Onondaga Lake or to the Seneca River for discharge. The determination of Onondaga Lake as the more economical discharge point led to the design and construction of a pump station and force main to transfer wastewater from the Ley Creek plant to the Metropolitan treatment plant. The existence of these pumping facilities has a significant impact on the development of an overall wastewater treatment system that makes optimum use of existing treatment facilities. It increases the number of feasible alternatives for wastewater treatment and consequently increases the wastewater combinations justifying laboratory treatability investigation.

The first major phase of the present study was the survey of industrial wastewater discharges in the Ley Creek Drainage area. Onondaga County furnished a comprehensive list of industries either served by the Ley Creek sewerage system or within the drainage area of Ley Creek. With the cooperation of the County and the individual industries, the Engineer's personnel evaluated the wastewater situation at each industry by interview, by inspection of production and wastewater handling facilities, and, where appropriate, by sampling and analysis of wastewaters. The principal criteria for determining that a particular industry warranted inclusion in the sampling and analysis survey were: 1) a major industry not currently connected to the Ley Creek sewerage system; 2) an industry with significant potential toxicity problems; and 3) an industry whose organic wastewater load constituted a significant portion of the total organic loading on the Ley Creek Sewage Treatment Plant. The information obtained from the interviews, visits, and wastewater surveys was used to assess the contribution of each industry and to provide guidance to each industry's wastewater management program. The findings and related recommendations were included in the appropriate industry sections of the Interim Report of 1 March 1969, *Industrial Discharges in the Ley Creek Sanitary District*. The most important of these findings were:

1. Twenty-four industries were discharging wastewaters (including clean cooling water) to Ley Creek, but only two of them showed a need for treatment facilities. The others either discharged acceptable effluents or could do so by the in-plant processing changes recommended in the Interim Report.

2. A number of industries were discharging metals and cyanides at significant concentrations to the Ley Creek sewage system. Apparently there has been sufficient dilution in the system to avoid any adverse effects on the biological treatment operations, but the potential for such interference is there.

3. One industry, Bristol Laboratories, contributed 80-90 percent of the industrial organic wastewater loading to the Ley Creek sewerage system and 50-60 percent of the total organics loading on the Ley Creek S.T.P.

Complementing the industrial wastewater investigation was a random grab sampling survey of the Ley Creek S.T.P. influent wastewater. Forty-two random grab samples were collected between 13 June and 20 June 1968 and analyzed at ROY F. WESTON laboratories. Flow measurements were recorded (from the treatment plant's influent flowmeter) at the time of each sample collection. With the expansion of the scope of the study to include the Metropolitan S.T.P. wastewater, a similar survey was conducted of that treatment plant's influent wastewater. Twenty-eight random grab samples were collected between 3 September and 10 September 1968 and were analyzed for the same contaminants as in the Ley Creek S.T.P. survey. Complete analytical results of the two treatment plant wastewater surveys are presented in Tables A-1 through A-8, and are summarized along with the specific industry surveys in Tables 1 through 5.

These data constitute the basis for definition of the wastewater quantities, sources, and characteristics and for planning of wastewater treatability investigations and development of a treatment system.

Development of a wastewater collection master plan for the Ley Creek Sanitary District and consideration of potential treatment alternatives were required before the treatability investigations and process design studies could be carried out in a reasonably efficient manner to produce meaningful results. The principal focus in the development of the wastewater collection master plan was the question of the adequacy of the existing Ley Creek collection system for handling present and anticipated future wastewater flows resulting from addition of industries not currently connected and from projected increases from sources already connected. The adequacy of the geographical coverage of the existing collection system was substantiated by the finding that all industries with significant wastewater flow and/or contaminant load were discharging at least their sanitary wastewater to the Ley Creek system, and most were discharging both industrial and sanitary wastewaters. Nevertheless, a few plants were discharging some contaminated wastewaters, along with cooling water and stormwater, directly to surface streams, and the impact of an eventual tie-in of these discharges on the municipal system had to be evaluated. Of the approximately 2 million gallons per day discharged directly to streams, practically all came from two industries, Crouse-Hinds and the General Motors Ternstedt Division. Crouse-Hinds is in the process of installing pretreatment facilities and in-plant processing modifications that will make its wastewater effluent suitable for discharge to the Ley Creek collection system. Ternstedt Division has demonstrated through periodic wastewater analytical reports that its treated effluent is acceptable for discharge to surface waters.

Connection of the few plants discharging sanitary wastewaters through on-site septic tank systems would be no big problem, primarily because the flows involved are quite small and because the collection system is reasonably accessible. However, there is no need to connect these sanitary discharges as long as the septic tank systems remain effective and appropriate.

Stormwater flow is another factor in assessing the hydraulic adequacy of the existing collection system because the Metropolitan sewers are combined sewers, i.e. they collect both wastewater and stormwater. Although the Ley Creek Sewer System is a separated sewer system, increases in flow are evident during periods of rainfall. The scope of the current study did not include determination of the frequency or magnitude of stormwater runoff. However, previous Onondaga County studies indicated that the Metropolitan system could handle about 175 mgd of storm flow and the Ley Creek system 40 mgd.

Many factors were involved in the determination of treatment systems capable of meeting the requirements for wastewater discharges in the Ley Creek-Metropolitan area. Numerous combinations of new and existing treatment facilities, treatment processes, effluent discharge points, pretreatment by individual industries, etc. with varying potentials for accomplishment of the desired objectives were developed and subjected to a preliminary screening, the results of which are presented in Table 11. This preliminary evaluation disclosed that several of the potential treatment schemes involved obvious economic or technical disadvantages. The remaining alternatives shown in the following tabulations furnished the basis for planning of the laboratory treatability studies and subsequent process design and cost estimating activities:

System Number	Treatment Involved
1-A	Secondary treatment of Ley Creek S.T.P. influent
1-B	Secondary treatment of the combination of clarified Ley Creek S.T.P. secondary effluent and the raw wastewater influent to the Metropolitan S.T.P.
2	Secondary treatment of the combined Ley Creek and Metropolitan raw wastewaters
3-A	Partial treatment (Plain Aeration) of Ley Creek S.T.P. influent
3-B	Secondary treatment of the combination of the clarified effluent from the Ley Creek Plain Aeration system and raw wastewater influent to the Metropolitan S.T.P.

Systems 1 and 3 were divided into two parts to facilitate identification and comparison of the alternatives. Each of the three systems utilizes the force main between the Ley Creek and Metropolitan Sewage Treatment Plants, and each involves the Metropolitan S.T.P. as the end of the treatment train. MSTP is preferred over LCSTP as the terminal point because there is more dilution available at an Onondaga Lake outfall, because the MSTP influent wastewater flow is about 3 times as much as the LCSTP influent, and because of the proposed location of future tertiary treatment facilities at MSTP. each system is applicable either to the entire projected wastewater load of the combined sanitary districts or to the wasteload reduced by industry pretreatment.

Since practically all major industries in the area are connected to the municipal sewerage systems, the influent wastewaters to the Ley Creek and Metropolitan Sewage Treatment Plants were the major concern in the process investigation. The relatively high organic concentrations and relatively low metals concentrations determined in the surveys indicated that organic loading is the major pollutant characteristic requiring treatment. Experience has shown the activated sludge process to be an economical, flexible, and dependable method for reducing the organic content of wastewaters.

Normally, domestic sewage does not require specific laboratory investigation to determine reaction rate and process design parameters, but in the present case there is a large enough proportion of industrial wastewater in the total wastewater flow to modify the normal characteristics of domestic sewage. Thus, laboratory investigations were conducted to obtain the design parameters required for conventional activated sludge and for the contact-stabilization modification of the activated sludge for various combinations of LCSTP and MSTP influent and partially-treated wastewaters. Plain aeration (essentially conventional activated sludge without sludge recycle) was investigated for preliminary treatment of the LCSTP influent. Complementary filtration studies were included to determine the extent of organic material associated with the solids in the wastewaters and to indicate the applicability of bioflocculation or initial contact removal. One industrial wastewater was investigated to determine the feasibility of oil removal in attaining an effluent acceptable for discharge to the municipal sewage system.

The laboratory programs included: operation of continuous-feed activated sludge systems over a wide range of organic pollutant loadings; several "Tube Runs" (a batch test to derive process design parameters); and related investigations of oxygen transfer and saturation characteristics and activated sludge settling and compaction requirements. The design parameters determined from the laboratory treatability investigations are summarized in Table 15. The process modifications selected on the basis of these tests are summarized below:

Wastewater	Process Modification
LCSTP Influent (1-A)	Conventional
LCSTP Secondary Effluent and MSTP Influent (1-B)	Contact-Stabilization
LCSTP and MSTP Influents (2)	Conventional
LCSTP Plain Aeration Effluent and MSTP Influent (3-B)	Contact-Stabilization

The laboratory investigation of System 2 (combined LCSTP and MSTP influent wastewaters) was conducted on a sample which was not subjected to primary clarification. A subsequent decision to include primary clarification in the overall treatment scheme stimulated a re-examination of the laboratory data. This showed that removal of suspended solids through primary clarification would change the indicated mode of treatment for System 2 from conventional to contact-stabilization.

The principal objective in the development of the process design was to establish a sound base for preliminary estimates of the capital and total annual costs of the several technically feasible treatment alternatives. The principal bases of design were: 1) the treatability parameters established in the laboratory investigations; 2) the requirement for 85 percent BOD (organic) removal under cold temperature conditions; and 3) a minimum of primary clarification for all wastewaters, including stormwaters. The latter requirement is met by the provision of two diversion chambers at the Metropolitan S.T.P.; the first diverts that volume of wastewater in excess of MSTP's design capacity to by-pass the primary clarifiers, while the second routes all the by-passed wastewater to the activated sludge tank and diverts a like volume of primary-treated wastewater directly to the final chlorination facilities. Major unit sizes, aeration requirements, estimated sludge production, and other design data are summarized in Table 16.

Preliminary estimates of the capital and total annual costs for the three alternative systems are presented in Tables 17 and 18; Table 17 covers capital and annual costs based on the total projected organic loading, while Table 18 covers the costs based on a reduced loading. This reduced loading represents the effects of the estimated 25,000 pounds per day of BOD_5 (roughly half the LCSTP loading) that would be kept out of the municipal system if Bristol Laboratories pretreated its wastewater.

The total annual costs include both operating and fixed costs, but do not include amortization of existing treatment facilities nor the costs associated with the collection systems, the pump station and force main, the proposed tertiary treatment facilities, or sludge digestion and disposal. The capital costs include a construction contingency but no engineering design fee. The overall costs for the three alternative systems are summarized as follows:

System	Capital Cost	Total Annual Costs
	Projected BOD Loading	
1	$30,300,000	$4,410,000
2	$26,100,000	$3,460,000
3	$23,200,000	$3,690,000
	Reduced BOD Loading	
1	$29,900,000	$4,230,000
2	$26,000,000	$3,440,000
3	$23,200,000	$3,680,000

These figures indicate the economic advantages of System 2, which treats the combined raw wastewaters of the Ley Creek and Metropolitan Sewage Treatment Plants. Further advantage for System 2 accrues from consideration of the current under-staffing at the present treatment plants due to a general lack of qualified manpower; phasing out the Ley Creek S.T.P. would provide a good source of manpower for proposed secondary and future tertiary treatment operations at the Metropolitan Sewage Treatment Plant.

Total annual cost savings achieved by operation on the basis of the reduced BOD loading are not significant. If industry should be required to pretreat its wastewater to attain this reduced loading, industry would spend considerably more than the municipal system would save. It would be mutually beneficial for Onondaga County to accept the full projected organic load provided that the affected industries pay an equitable share of the treatment costs.

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ACKNOWLEDGEMENTS

The cooperation of industry participants in this study, especially those who permitted samples of their effluent to be taken and the results reported, is acknowledged with sincere thanks.

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The field sampling surveys, analytical work, bench-scale treatability studies and report editing were performed by a team from ROY F. WESTON, INC. consisting of Mr. G. W. Berman, Mr. A. B. Chandler, Mr. T. F. Rooney and Mr. J. L. Simons.

The assitance and cooperation of employees of Onondaga County at both the Metropolitan and Ley Creek Sewage Plants is greatly appreciated.

The support of the project by the Federal Water Pollution Control Administration and the help provided by Mr. George Rey, Mr. Edward Dulaney, and Mr. L. E. Townsend is acknowledged with sincere appreciation.

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APPENDICES

APPENDIX A - Raw Data Tables

APPENDIX B - Drawings

APPENDIX C - Onondaga County's Rules and Regulations Governing the Use of Public Sewers

APPENDIX D - Quality Standards for Class D Waters - New York State Department of Health

TABLE A-1

THIS TABULATION IS THE RAW DATA FROM THE SURVEY
FLOW IS IN MILLION GALLONS PER DAY
CONCENTRATIONS ARE IN MILLIGRAMS PER LITER

RANDOM GRAB SURVEY - INFLUENT

ID	DATE	TIME	FLOW	PH	ALK	ACID	BOD-5	BOD UC	COD	SS	VSS	OIL	CN-	PHENOL	TOT CR	COPPER	ZINC	CADM	NICKEL	NH3-N	ORG-N	PO4-O	PO
001	06 13 68	1500	18.8	7.4	28	0	190	212	432	276	140	70.5	0.024	0.07	0.44	0.28	0.69	0.10	0.125	9.6	26.6	25	
002	06 13 68	2000	15.6	6.5	0	20	388	530	936	586	216	83.0	0.024	0.33	0.20	0.22	0.39	0.03	0.120	19.5	28.7	35	
003	06 13 68	2100	15.7	6.6	0	16	260	565	696	616	320	93.0	0.010	0.06	0.34	0.12	0.70	0.15	0.150	15.7	23.0	48	
004	06 13 68	2400	14.3	7.4	28	0	800	810	1248	1024	232	157.0	0.000*	0.20	0.27	0.35	0.68	0.05	0.115	11.9	26.0	35	
005	06 14 68	0600	10.2	6.2	0	60	450	600	792	420	224	63.0	0.009	0.00*	0.45	0.16	0.76	0.02	0.145	26.6	38.4	180	
006	06 14 68	0800	13.3	6.5	0	30	19[illegible]	276	368	148	76	46.5	0.018	0.26	0.23	0.10	0.56	0.05	0.185	9.8	14.7	8	
007	06 14 68	1600	18.3	6.4	0	22	372	468	720	500	320	62.0	0.160	0.11	0.39	0.50	0.74	0.10	0.150	17.8	27.8	27	
008	06 14 68	1700	18.0	6.6	154	0	330	690	995	672	360	74.0	0.184	0.54	0.52	0.42	0.74	0.08	0.115	13.7	45.5	28	
009	06 14 68	2300	14.2	7.0	0	0	360	552	893	252	252	139.0	0.003	0.20	0.19	0.29	0.50	0.05	0.000*	14.6	23.4	20	
010	06 15 68	0100	13.2	6.3	0	24	432	660	939	448	268	62.5	0.003	0.31	0.15	0.39	0.58	0.10	0.000*	11.9	24.2	24	
011	06 15 68	0400	10.2	7.0	0	0	567	816	1150	464	220	98.5	0.001	0.15	0.12	0.20	0.50	0.04	0.150	11.3	21.2	13	
012	06 15 68	1200	15.6	7.0	0	0	28[illegible]	420	597	332	224	52.5	0.092	0.15	0.15	0.25	1.41	0.04	0.045	11.0	26.3	26	
013	06 15 68	1300	15.6	7.0	0	0	27[illegible]	399	731	360	228	45.0	0.226	0.04	0.22	0.40	0.47	0.05	0.040	14.8	35.0	20	
014	06 15 68	1600	13.3	6.0	0	60	336	477	770	256	200	53.5	0.002	0.00*	0.15	0.36	0.90	0.02	0.020	7.8	10.6	19	
015	06 15 68	2100	15.0	6.9	0	2	1620	2010	2735	1232	360	70.0	0.001	0.13	0.15	0.40	0.90	0.03	0.000*	24.6	42.0	32	
016	06 16 68	0200	10.5	6.7	0	6	1080	1410	2235	326	248	84.0	0.002	0.17	0.22	0.18	0.78	0.02	0.060	13.4	11.2	31	
017	06 16 68	0700	12.8	7.1	2	0	255	288	462	80	72	24.4	0.000*	0.15	0.14	0.10	0.17	0.02	0.000*	16.5	21.8	10	
018	06 16 68	1200	13.0	7.0	0	0	210	240	423	164	140	37.2	0.000*	0.19	0.14	0.14	0.22	0.02	0.000*	25.2	34.2	40	
019	06 16 68	1500	13.0	8.0	60	0	444	612	904	456	336	54.2	0.000*	0.27	0.12	0.23	0.31	0.02	0.000*	13.2	31.9	28	
020	06 16 68	1900	13.0	6.8	0	4	480	900	1230	724	336	126.0	0.000*	0.86	0.34	0.45	0.88	0.06	0.000*	16.8	27.7	33	
021	06 16 68	2100	11.0	6.8	0	4	276	396	1000	1016	432	105.0	0.000*	0.01	0.43	0.62	1.06	0.09	0.000*	18.5	29.4	38	
022	06 17 68	0300	9.7	8.8	130	0	696	768	1144	852	232	93.5	0.000*	0.15	0.15	0.16	0.25	0.03	0.000*	12.6	21.8	20	
023	06 17 68	0800	9.7	7.0	0	0	648	864	1079	2232	1312	144.0	0.000*	0.01	0.20	0.21	0.44	0.02	0.000*	15.4	22.4	9	
024	06 17 68	1000	17.3	7.1	2	0	177	270	500	456	180	64.[illegible]	0.000*	0.19	0.27	0.39	0.78	0.04	0.000*	18.5	26.8	15	
025	06 17 68	1300	17.3	7.0	0	0	396	528	800	468	264	142.0	0.001	0.47	1.38	0.50	0.88	0.08	0.265	15.7	20.9	20	
[illegible]	[illegible] 17 68	1900	15.7	7.0	0	0	510	696	1030	516	260	103.0	0.001	0.61	0.57	0.41	1.10	0.31	0.080	15.1	23.9	25	
027	06 17 68	2200	15.0	7.0	0	0	342	417	800	376	216	103.0	0.001	0.24	0.36	0.26	0.74	0.06	0.190	10.4	33.1	36	
028	06 18 68	0200	10.4	6.8	0	4	73[illegible]	864	1220	420	164	95.5	0.001	0.16	0.22	0.14	1.30	0.02	0.175	10.7	18.2	15	
029	06 18 68	0700	9.6	8.0	62	0	192	249	329	20	[illegible]	41.5	0.002	0.30	0.14	0.14	0.42	0.02	0.135	22.4	25.2	10	
030	06 18 68	0900	12.3	7.4	28	0	684	912	1065	312	124	66.0	0.000*	0.12	0.34	0.16	0.58	0.02	0.020	15.4	22.4	15	
031	06 18 68	1600	15.2	6.3	0	24	438	606	1242	624	460	63.5	0.758	0.90	0.34	0.39	0.76	0.20	0.135	15.4	47.3	35	
032	06 18 68	1800	16.3	6.9	0	2	540	750	1253	1240	428	109.0	0.083	0.43	0.47	0.34	0.70	0.09	0.240	15.4	34.4	32	
033	06 18 68	2100	15.7	6.9	0	2	384	540	1004	1036	468	172.[illegible]	0.124	0.28	0.50	0.54	1.14	0.15	0.180	20.9	29.7	38	
034	06 19 68	0300	11.0	7.0	0	0	32[illegible]	396	944	412	264	81.[illegible]	0.140	0.04	0.24	0.16	0.78	0.04	0.15[illegible]	14.6	22.1	13	
035	06 19 68	0600	9.1	7.1	2	0	372	575	1310	436	328	59.5	[illegible]	0.98	0.14	0.12	0.66	0.02	0.070	17.4	56.3	18	
036	06 19 68	0900	13.2	6.2	0	36	411	501	944	408	256	77.5	[illegible]	0.14	0.22	0.19	0.90	0.06	0.240	13.4	23.8	16	
037	06 19 68	1400	17.2	7.0	0	0	42[illegible]	510	914	412	344	85.5	[illegible]	0.00*	0.50	[illegible]	0.88	0.09	0.200	20.7	33.6	22	
038	06 19 68	1900	15.8	7.0	0	0	[illegible]	555	1314	1820	776	165.0	[illegible]	0.10	0.64	0.44	0.96	0.20	0.175	20.7	35.0	34	
039	06 19 68	2100	15.7	7.0	0	0	456	624	1545	2492	604	134.0	[illegible]	0.00*	0.50	0.43	1.00	0.08	0.215	20.7	35.0	45	
040	06 20 68	0100	13.8	7.1	2	0	330	615	1430	856	568	63.5	0.000*	0.02	0.29	0.20	0.92	0.06	0.195	30.8	46.8	22	
041	06 20 68	0500	9.2	7.0	0	0	144[illegible]	1950	2784	1316	468	286.0	0.014	[illegible]*	0.22	0.18	0.44	0.02	0.060	19.6	25.4	25	
042	06 20 68	1100	15.5	7.0	0	0	28[illegible]	434	70[illegible]	320	13[illegible]	65.0	0.019	0.14	0.64	0.10	0.90	0.10	0.030	16.8	13.7	14	

*=NO ANALYSIS

Total oil and grease

A

TABLE A-2

THIS TABULATION IS THE RANKED RA
FLOW IS IN MILLION GALLONS PE

RANDOM GRAB SURVEY - INFLUE

ID	PLOT	FLOW	PLOT	PH	PLOT	ALK	PLOT	ACID	PLOT	BOD-5	PLOT	BOD UC	PLOT	COD	PLOT	SS	PLOT	VSS	PLOT	OIL	PLOT	CN-	PLOT	PHENOL
001	0.023	8.7	0.023	6.0	0.023	0	0.023	0	0.023	177	0.023	212	0.023	329	0.023	20	0.024	72	0.023	24.4	0.031	0.001	0.026	0.01
002	0.047	9.1	0.047	6.2	0.047	0	0.047	0	0.047	190	0.047	240	0.047	368	0.047	80	0.048	76	0.047	37.2	0.062	0.001	0.053	0.01
003	0.070	9.2	0.070	6.2	0.070	0	0.070	0	0.070	192	0.070	249	0.070	423	0.070	148	0.071	124	0.070	41.5	0.094	0.001	0.079	0.02
004	0.093	9.6	0.093	6.3	0.093	0	0.093	0	0.093	198	0.093	270	0.093	432	0.093	164	0.095	136	0.093	45.0	0.125	0.001	0.105	0.04
005	0.116	9.7	0.116	6.3	0.116	0	0.116	0	0.116	210	0.116	276	0.116	462	0.116	252	0.119	140	0.116	46.5	0.156	0.001	0.132	0.04
006	0.140	10.2	0.140	6.4	0.140	0	0.140	0	0.140	255	0.140	288	0.140	500	0.140	256	0.143	140	0.140	52.5	0.187	0.001	0.158	0.04
007	0.163	10.2	0.163	6.5	0.163	0	0.163	0	0.163	260	0.163	396	0.163	597	0.163	276	0.167	164	0.163	53.5	0.219	0.002	0.184	0.06
008	0.186	10.4	0.186	6.5	0.186	0	0.186	0	0.186	270	0.186	396	0.186	696	0.186	312	0.190	180	0.186	54.2	0.250	0.002	0.211	0.07
009	0.209	10.5	0.209	6.6	0.209	0	0.209	0	0.209	270	0.209	399	0.209	705	0.209	320	0.214	200	0.209	59.5	0.281	0.002	0.237	0.10
010	0.233	11.0	0.233	6.7	0.233	0	0.233	0	0.233	276	0.233	417	0.233	720	0.233	326	0.238	216	0.233	62.0	0.312	0.003	0.263	0.11
011	0.256	11.8	0.256	6.8	0.256	0	0.256	0	0.256	282	0.256	420	0.256	731	0.256	332	0.262	216	0.256	62.5	0.344	0.003	0.289	0.12
012	0.279	12.3	0.279	6.8	0.279	0	0.279	0	0.279	288	0.279	438	0.279	770	0.279	360	0.286	220	0.279	63.0	0.375	0.009	0.316	0.13
013	0.302	12.8	0.302	6.8	0.302	0	0.302	0	0.302	321	0.302	468	0.302	792	0.302	376	0.310	224	0.302	63.5	0.406	0.010	0.342	0.14
014	0.326	13.0	0.326	6.9	0.326	0	0.326	0	0.326	330	0.326	477	0.326	800	0.326	408	0.333	224	0.326	63.5	0.437	0.014	0.368	0.15
015	0.349	13.0	0.349	6.9	0.349	0	0.349	0	0.349	336	0.349	501	0.349	800	0.349	412	0.357	228	0.349	64.5	0.469	0.018	0.395	0.15
016	0.372	13.0	0.372	6.9	0.372	0	0.372	0	0.372	342	0.372	510	0.372	838	0.372	412	0.381	232	0.372	65.0	0.500	0.019	0.421	0.15
017	0.395	13.2	0.395	7.0	0.395	0	0.395	0	0.395	360	0.395	528	0.395	893	0.395	420	0.405	232	0.395	66.0	0.531	0.019	0.447	0.15
018	0.419	13.2	0.419	7.0	0.419	0	0.419	0	0.419	372	0.419	530	0.419	904	0.419	428	0.429	248	0.419	70.0	0.562	0.024	0.474	0.16
019	0.442	13.3	0.442	7.0	0.442	0	0.442	0	0.442	372	0.442	540	0.442	914	0.442	436	0.452	252	0.442	70.5	0.594	0.024	0.500	0.17
020	0.465	13.3	0.465	7.0	0.465	0	0.465	0	0.465	384	0.465	552	0.465	936	0.465	448	0.476	256	0.465	74.0	0.625	0.024	0.526	0.19
021	0.488	13.8	0.488	7.0	0.488	0	0.488	0	0.488	388	0.488	555	0.488	944	0.488	456	0.500	260	0.488	77.5	0.656	0.034	0.553	0.19
022	0.512	14.2	0.512	7.0	0.512	0	0.512	0	0.512	390	0.512	563	0.512	944	0.512	456	0.524	264	0.512	81.5	0.687	0.040	0.579	0.20
023	0.535	14.3	0.535	7.0	0.535	0	0.535	0	0.535	396	0.535	576	0.535	995	0.535	464	0.548	268	0.535	83.0	0.719	0.058	0.605	0.20
024	0.558	15.0	0.558	7.0	0.558	0	0.558	0	0.558	411	0.558	600	0.558	1000	0.558	467	0.571	284	0.558	84.0	0.750	0.083	0.632	0.24
025	0.581	15.0	0.581	7.0	0.581	0	0.581	0	0.581	420	0.581	606	0.581	1004	0.581	500	0.595	320	0.581	85.5	0.781	0.092	0.658	0.26
026	0.605	15.2	0.605	7.0	0.605	0	0.605	0	0.605	432	0.605	612	0.605	1030	0.605	516	0.619	320	0.605	93.0	0.812	0.124	0.684	0.27
027	0.628	15.5	0.628	7.0	0.628	0	0.628	2	0.628	438	0.628	615	0.628	1065	0.628	586	0.643	328	0.628	93.5	0.844	0.150	0.711	0.28
028	0.651	15.6	0.651	7.0	0.651	0	0.651	2	0.651	444	0.651	624	0.651	1079	0.651	616	0.667	336	0.651	95.5	0.875	0.160	0.737	0.30
029	0.674	15.6	0.674	7.0	0.674	0	0.674	2	0.674	480	0.674	660	0.674	1150	0.674	624	0.690	336	0.674	98.5	0.906	0.184	0.763	0.31
030	0.698	15.6	0.698	7.0	0.698	0	0.698	4	0.698	456	0.698	690	0.698	1194	0.698	672	0.714	344	0.698	103.0	0.937	0.226	0.789	0.33
031	0.721	15.7	0.721	7.0	0.721	0	0.721	4	0.721	480	0.721	696	0.721	1220	0.721	724	0.738	360	0.721	103.0	0.969	0.758	0.816	0.43
032	0.744	15.7	0.744	7.1	0.744	2	0.744	4	0.744	510	0.744	750	0.744	1230	0.744	852	0.762	360	0.744	105.0	0.000	0.000*	0.842	0.47
033	0.767	15.7	0.767	7.1	0.767	2	0.767	6	0.767	540	0.767	768	0.767	1248	0.767	856	0.786	428	0.767	109.0	0.000	0.000*	0.868	0.54
034	0.791	15.7	0.791	7.1	0.791	2	0.791	16	0.791	567	0.791	810	0.791	1253	0.791	1016	0.810	432	0.791	126.0	0.000	0.000*	0.895	0.61
035	0.814	15.8	0.814	7.1	0.814	2	0.814	20	0.814	600	0.814	816	0.814	1292	0.814	1024	0.833	460	0.814	134.0	0.000	0.000*	0.921	0.86
036	0.837	16.3	0.837	7.4	0.837	28	0.837	22	0.837	648	0.837	864	0.837	1310	0.837	1036	0.857	468	0.837	139.0	0.000	0.000*	0.947	0.90
037	0.860	17.2	0.860	7.4	0.860	28	0.860	24	0.860	684	0.860	864	0.860	1314	0.860	1232	0.881	468	0.860	142.0	0.000	0.000*	0.974	0.98
038	0.884	17.3	0.884	7.4	0.884	28	0.884	24	0.884	696	0.884	900	0.884	1430	0.884	1240	0.905	568	0.884	144.0	0.000	0.000*	0.000	0.00*
039	0.907	17.3	0.907	8.0	0.907	60	0.907	30	0.907	738	0.907	912	0.907	1545	0.907	1316	0.929	604	0.907	157.0	0.000	0.000*	0.000	0.00*
040	0.930	18.0	0.930	8.0	0.930	62	0.930	36	0.930	1080	0.930	1410	0.930	2235	0.930	1820	0.952	776	0.930	165.0	0.000	0.000*	0.000	0.00*
041	0.953	18.3	0.953	8.6	0.953	130	0.953	60	0.953	1440	0.953	1950	0.953	2735	0.953	2232	0.976	1312	0.953	172.0	0.000	0.000*	0.000	0.00*
042	0.977	18.8	0.977	8.8	0.977	154	0.977	60	0.977	1620	0.977	2010	0.977	2784	0.977	2492	0.000	0*	0.977	286.0	0.000	0.000*	0.000	0.00*
MEAN		13.7		7.0		12		8		465		642		1038		652		319		90.8		.087		.25
STD DEV		2.7		.5		33		15		249		379		529		534		215		47.5		.142		.24

*=NO ANALYSIS

B

TABLE A-2

ABULATION IS THE RANKED RAW DATA
IS IN MILLION GALLONS PER DAY

NDOM GRAB SURVEY - INFLUENT

LOT	CN-	PLOT	PHENOL	PLOT	TOT CR	PLOT	COPPER	PLOT	ZINC	PLOT	CADM	PLOT	NICKEL	PLOT	NH3-N	PLOT	ORG-N	PLOT	PO4-O	PLOT	PO4TOT
.031	0.001	0.026	0.01	0.023	0.12	0.023	0.10	0.023	0.17	0.023	0.02	0.031	0.020	0.023	7.8	0.023	10.6	0.023	8	0.023	15
.062	0.001	0.053	0.01	0.047	0.12	0.047	0.10	0.047	0.22	0.047	0.02	0.062	0.020	0.047	9.6	0.047	11.2	0.047	9	0.047	15
.094	0.001	0.079	0.02	0.070	0.14	0.070	0.10	0.070	0.25	0.070	0.02	0.094	0.030	0.070	9.8	0.070	13.7	0.070	10	0.070	17
.125	0.001	0.105	0.04	0.093	0.14	0.093	0.12	0.093	0.31	0.093	0.02	0.125	0.040	0.093	10.4	0.093	14.7	0.093	10	0.093	22
.156	0.001	0.132	0.04	0.116	0.14	0.116	0.12	0.116	0.39	0.116	0.02	0.156	0.045	0.116	10.7	0.116	18.2	0.116	13	0.116	22
.187	0.001	0.158	0.04	0.140	0.14	0.140	0.14	0.140	0.42	0.140	0.02	0.187	0.060	0.140	11.0	0.140	20.9	0.140	13	0.140	25
.219	0.002	0.184	0.06	0.163	0.15	0.163	0.14	0.163	0.44	0.163	0.02	0.219	0.060	0.163	11.3	0.163	21.2	0.163	14	0.163	25
.250	0.002	0.211	0.07	0.186	0.15	0.186	0.14	0.186	0.44	0.186	0.02	0.250	0.070	0.186	11.9	0.186	21.8	0.186	15	0.186	29
.281	0.002	0.237	0.10	0.209	0.15	0.209	0.16	0.209	0.47	0.209	0.02	0.281	0.080	0.209	11.9	0.209	21.8	0.209	15	0.209	34
.312	0.003	0.263	0.11	0.233	0.15	0.233	0.16	0.233	0.50	0.233	0.02	0.312	0.115	0.233	12.6	0.233	22.1	0.233	15	0.233	35
.344	0.003	0.289	0.12	0.256	0.15	0.256	0.16	0.256	0.50	0.256	0.02	0.344	0.115	0.256	13.2	0.256	22.4	0.256	16	0.256	38
.375	0.009	0.316	0.13	0.279	0.19	0.279	0.16	0.279	0.56	0.279	0.02	0.375	0.120	0.279	13.4	0.279	22.4	0.279	18	0.279	40
.406	0.010	0.342	0.14	0.302	0.20	0.302	0.18	0.302	0.58	0.302	0.03	0.406	0.125	0.302	13.4	0.302	23.0	0.302	19	0.302	40
.437	0.014	0.368	0.15	0.326	0.20	0.326	0.18	0.326	0.58	0.326	0.03	0.437	0.135	0.326	13.7	0.326	23.4	0.326	20	0.326	40
.469	0.018	0.395	0.15	0.349	0.22	0.349	0.19	0.349	0.66	0.349	0.03	0.469	0.135	0.349	14.6	0.349	23.8	0.349	20	0.349	43
.500	0.019	0.421	0.15	0.372	0.22	0.372	0.20	0.372	0.68	0.372	0.04	0.500	0.145	0.372	14.6	0.372	23.9	0.372	20	0.372	45
.531	0.019	0.447	0.15	0.395	0.22	0.395	0.20	0.395	0.69	0.395	0.04	0.531	0.150	0.395	14.8	0.395	24.2	0.395	20	0.395	45
.562	0.024	0.474	0.16	0.419	0.22	0.419	0.21	0.419	0.70	0.419	0.04	0.562	0.150	0.419	15.1	0.419	25.2	0.419	22	0.419	45
.594	0.024	0.500	0.17	0.442	0.22	0.442	0.22	0.442	0.70	0.442	0.04	0.594	0.150	0.442	15.4	0.442	25.4	0.442	22	0.442	46
.625	0.024	0.526	0.19	0.465	0.23	0.465	0.23	0.465	0.74	0.465	0.05	0.625	0.155	0.465	15.4	0.465	26.0	0.465	24	0.465	50
.656	0.034	0.553	0.19	0.488	0.24	0.488	0.25	0.488	0.74	0.488	0.05	0.656	0.175	0.488	15.4	0.488	26.3	0.488	25	0.488	50
.687	0.040	0.579	0.20	0.512	0.27	0.512	0.26	0.512	0.74	0.512	0.05	0.687	0.175	0.512	15.4	0.512	26.6	0.512	25	0.512	57
.719	0.058	0.605	0.20	0.535	0.27	0.535	0.28	0.535	0.76	0.535	0.05	0.719	0.180	0.535	15.7	0.535	26.8	0.535	25	0.535	57
.750	0.083	0.632	0.24	0.558	0.29	0.558	0.29	0.558	0.76	0.558	0.06	0.750	0.185	0.558	15.7	0.558	27.7	0.558	26	0.558	59
.781	0.092	0.658	0.26	0.581	0.34	0.581	0.34	0.581	0.78	0.581	0.06	0.781	0.190	0.581	16.5	0.581	27.8	0.581	27	0.581	60
.812	0.124	0.684	0.27	0.605	0.34	0.605	0.35	0.605	0.78	0.605	0.06	0.812	0.195	0.605	16.8	0.605	28.7	0.605	28	0.605	61
.844	0.150	0.711	0.28	0.628	0.34	0.628	0.36	0.628	0.78	0.628	0.06	0.844	0.200	0.628	16.8	0.628	29.4	0.628	28	0.628	63
.875	0.160	0.737	0.30	0.651	0.34	0.651	0.39	0.651	0.80	0.651	0.08	0.875	0.215	0.651	17.4	0.651	29.7	0.651	31	0.651	65
.906	0.184	0.763	0.31	0.674	0.36	0.674	0.39	0.674	0.88	0.674	0.08	0.906	0.240	0.674	17.8	0.674	31.9	0.674	32	0.674	65
.937	0.226	0.789	0.33	0.698	0.39	0.698	0.39	0.698	0.88	0.698	0.08	0.937	0.240	0.698	18.5	0.698	33.1	0.698	32	0.698	65
.969	0.758	0.816	0.43	0.721	0.43	0.721	0.40	0.721	0.88	0.721	0.09	0.969	0.265	0.721	18.5	0.721	33.6	0.721	33	0.721	65
.000	0.000*	0.842	0.47	0.744	0.44	0.744	0.40	0.744	0.90	0.744	0.09	0.000	0.000*	0.744	19.5	0.744	34.2	0.744	34	0.744	65
.000	0.000*	0.868	0.54	0.767	0.45	0.767	0.40	0.767	0.90	0.767	0.09	0.000	0.000*	0.767	19.6	0.767	34.4	0.767	35	0.767	65
.000	0.000*	0.895	0.61	0.791	0.47	0.791	0.41	0.791	0.90	0.791	0.10	0.000	0.000*	0.791	20.7	0.791	35.0	0.791	35	0.791	70
.000	0.000*	0.921	0.86	0.814	0.50	0.814	0.42	0.814	0.92	0.814	0.10	0.000	0.000*	0.814	20.7	0.814	35.0	0.814	35	0.814	70
.000	0.000*	0.947	0.90	0.837	0.50	0.837	0.44	0.837	0.96	0.837	0.10	0.000	0.000*	0.837	20.7	0.837	35.0	0.837	36	0.837	70
.000	0.000*	0.974	0.98	0.860	0.50	0.860	0.45	0.860	1.00	0.860	0.10	0.000	0.000*	0.360	20.9	0.860	38.4	0.860	38	0.860	70
.000	0.000*	0.000	0.00*	0.884	0.52	0.884	0.48	0.884	1.06	0.884	0.15	0.000	0.000*	0.884	22.4	0.884	42.0	0.884	38	0.884	78
.000	0.000*	0.000	0.00*	0.907	0.57	0.907	0.50	0.907	1.10	0.907	0.15	0.000	0.000*	0.907	24.6	0.907	45.5	0.907	40	0.907	81
.000	0.000*	0.000	0.00*	0.930	0.64	0.930	0.50	0.930	1.14	0.930	0.20	0.000	0.000*	0.930	25.2	0.930	46.8	0.930	45	0.930	83
.000	0.000*	0.000	0.00*	0.953	0.64	0.953	0.54	0.953	1.30	0.953	0.20	0.000	0.000*	0.953	26.6	0.953	47.3	0.953	48	0.953	93
.000	0.000*	0.000	0.00*	0.977	1.38	0.977	0.62	0.977	1.41	0.977	0.31	0.000	0.000*	0.977	30.8	0.977	56.3	0.977	180	0.977	230
	.067		.25		.32		.28		.72		.06		.134		16.3		28.2		29		55
	.142		.24		.22		.14		.27		.06		.068		4.9		9.7		26		34

A

TABLE A-3

THIS TABULATION IS THE DATA EXTENDE
FLOW IS IN MILLION GALLONS

RANDOM GRAB SURVEY - INF

ID	DATE	TIME	FLOW	PH	ALK	ACID	BOD-5	BOD UC	COD	SS	VSS	OIL	CN-
001	06 13 68	1500	18.8	7.4	4385	0	29755	33200	67653	43223	21925	11040.5	3.75
002	06 13 68	2000	15.6	6.3	0	2599	50420	68872	121631	76149	28069	10785.6	3.11
003	06 13 68	2100	15.7	6.6	0	2092	34003	73891	91024	80561	41350	12162.6	1.307
004	06 13 68	2400	14.3	7.4	3335	0	71471	96486	148660	121978	27636	18701.6	0.000
005	06 14 68	0600	10.2	6.2	0	5098	3[illegible]235	50980	67293	35686	19032	5352.8	0.76
006	06 14 68	0800	13.3	6.[illegible]	0	3324	21936	30578	40770	16397	8420	5151.6	1.99
007	06 14 68	1600	1[illegible].3	6.4	0	3354	56707	71341	109756	76219	48780	9451.2	24.39
008	06 14 68	1700	16.0	5.6	23091	0	49480	103459	149190	100760	53978	11095.5	27.58
009	06 14 68	2300	14.2	7.0	0	0	42583	65294	105629	29808	29808	16441.7	0.35
010	06 15 68	0100	13.2	6.3	0	2639	47501	72571	92143	49260	29468	6872.2	0.32
011	06 15 68	0400	10.2	7.0	0	0	48176	69332	97711	39424	18693	8369.1	0.085
012	06 15 68	1200	15.6	7.0	0	0	37425	54578	77579	43143	29108	6822.2	11.955
013	06 15 68	1300	15.6	7.0	0	0	35086	51849	94992	46781	29628	5847.6	29.36
014	06 15 68	1600	13.3	6.0	0	6647	37225	52846	85307	28362	22158	5927.2	0.22
015	06 15 68	2100	15.0	6.9	0	250	202419	251149	341738	153938	44982	8746.5	0.125
016	06 16 68	0200	10.5	6.7	0	525	94462	123326	195484	28514	21691	7347.0	0.175
017	06 16 68	0700	12.8	7.1	213	0	27189	30708	49260	8530	7677	2601.6	0.000
018	06 16 68	1200	13.0	7.0	0	0	22741	25990	45807	17760	15161	4028.3	0.000
019	06 16 68	1500	13.0	8.0	6497	0	48031	66273	97894	49380	36385	5869.3	0.000
020	06 16 68	1900	13.0	6.8	0	433	51979	97461	133197	78402	36385	13644.5	0.000
021	06 16 68	2100	11.0	6.8	0	367	25290	36285	91630	93096	39584	9621.1	0.000
022	06 17 68	0300	5.7	8.8	5421	0	50440	55658	86530	61745	16813	6776.0	0.000
023	06 17 68	0800	9.7	7.0	0	0	52359	69812	87184	180348	106011	11635.3	0.000
024	06 17 68	1000	17.3	7.1	288	0	25507	38909	72054	65714	25940	9295.0	0.000
025	06 17 68	1300	17.3	7.0	0	0	57067	76089	115287	67443	38045	20463.4	0.144
026	06 17 68	1900	15.7	7.0	0	0	66698	91024	134704	67483	34003	13470.4	0.130
027	06 17 68	2200	1[illegible].0	7.0	0	0	42733	52104	99960	46981	26989	12869.8	0.125
028	06 18 68	0200	10.4	6.8	0	347	53934	74850	105691	36385	14208	8273.3	0.086
029	06 18 68	0700	9.6	8.0	4958	0	15354	19912	26309	1599	0*	3318.6	0.160
030	06 18 68	0900	12.3	7.4	2869	0	70042	93443	109119	31967	12705	6762.3	0.000
031	06 18 68	1600	1[illegible].2	6.3	0	3039	55458	76729	163588	79008	58243	8040.1	95.975
032	06 18 68	1800	16.3	6.[illegible]	0	272	73321	101834	170131	168366	58113	14799.9	11.269
033	06 18 68	2100	15.7	6.9	0	262	50220	70622	131304	135489	61205	22494.3	16.216
034	06 19 68	0300	11.0	7.0	0	0	24413	36285	86499	37752	26023	7467.8	3.665
035	06 19 68	0600	9.1	7.1	152	0	28199	43662	99302	33050	24863	4510.2	1.819
036	06 19 68	0900	13.2	6.2	0	3958	45192	55088	103798	44862	28149	8521.5	16.493
037	06 19 68	1400	17.2	7.0	0	0	60176	73071	130954	59030	49287	12250.1	2.722
038	06 19 68	1900	15.8	7.0	0	0	35536	73046	172941	239537	102132	21716.3	4.474
039	06 19 68	2100	15.7	7.0	0	0	59636	81607	202057	325906	78992	17524.6	7.585
040	06 [illegible]0 6[illegible]	0100	13.[illegible]	7.1	235	0	44232	70697	164384	98401	65294	7299.5	0.000
041	06 [illegible]0 68	0[illegible]	[illegible].2	7.0	0	0	110356	149440	213354	100853	35866	21917.8	1.073
042	06 [illegible] 68	1100	15.5	7.0	0	0	36410	56552	91026	41317	17560	8392.4	2.453

*=NO ANALYSIS

TABLE A-3

DATA EXTENDED TO POUNDS PER DAY
ILLION GALLONS PER DAY

B SURVEY - INFLUENT

OIL	CN-	PHENOL	TOT CR	COPPER	ZINC	CADM	NICKEL	NH3-N	ORG-N	PO4-O	PO4-T
11040.5	3.758	10.96	68.90	43.85	108.05	15.66	19.575	1503.4	4165.6	3915	7204
10785.6	3.118	42.88	25.99	28.58	50.68	3.89	15.593	2533.9	3729.5	4548	8447
12162.6	1.307	7.84	44.46	15.69	91.54	19.61	19.617	2053.2	3007.9	6277	9155
18701.6	0.000*	23.82	32.16	41.69	81.00	5.95	13.698	1417.5	3097.1	4169	5956
5352.8	0.764	0.00*	38.23	13.59	64.57	1.70	12.320	2260.1	3262.7	15294	17342
5151.6	1.994	28.80	25.48	11.07	62.04	5.54	20.496	1085.7	1628.6	886	[illegible]
9451.2	24.390	16.76	59.45	76.22	112.80	15.24	22.865	2713.4	4237.8	4116	9909
11095.5	27.589	80.96	77.96	62.97	110.95	11.99	17.243	2054.1	6822.2	4198	10496
16441.7	0.354	23.65	22.47	34.30	59.14	5.91	0.000*	1726.1	2767.9	2366	4731
6872.2	0.329	34.08	16.49	42.88	63.77	10.99	0.000*	1300.4	2660.9	2633	4948
8369.1	0.085	12.74	10.19	16.99	42.48	3.39	12.745	960.1	1801.2	1105	3399
6822.2	11.955	19.49	19.49	32.48	183.22	5.19	5.847	1429.4	3417.6	3379	12065
5847.6	29.368	5.19	28.58	51.98	61.07	6.49	5.198	1923.2	4548.1	2599	10136
5927.2	0.221	0.00*	16.61	39.88	99.71	2.21	2.215	864.1	1174.3	2105	9195
8746.5	0.125	16.24	18.74	49.98	112.45	3.74	0.000*	3073.7	5247.9	3998	7872
7347.0	0.175	14.87	19.24	15.74	68.22	1.75	5.248	1172.0	979.6	2711	3499
2601.6	0.000*	15.99	14.92	10.66	18.12	2.13	0.000*	1759.3	2324.4	1066	1599
4028.3	0.000*	20.57	15.16	15.16	23.82	2.16	0.000*	2728.9	3703.5	4332	7039
5869.3	0.000*	29.23	12.99	24.90	33.57	2.16	0.000*	1429.4	3454.4	3032	7580
13644.5	0.000*	93.13	36.81	48.73	95.29	6.49	0.000*	1819.2	2999.6	3574	7039
9621.1	0.000*	0.91	39.40	56.81	97.12	8.24	0.000*	1695.1	2693.9	3482	5956
6776.0	0.000*	10.87	10.87	11.59	18.11	2.17	0.000*	913.1	1579.8	1449	2261
11635.3	0.000*	0.80	16.16	16.96	35.55	1.61	0.000*	1244.3	1809.9	727	1778
9295.0	0.000*	27.38	38.91	56.20	112.40	5.76	0.000*	2665.0	3862.1	2162	9367
20463.4	0.144	67.73	198.87	72.05	126.81	11.52	38.188	2262.5	3011.8	2882	6485
13470.4	0.130	79.77	74.54	53.62	143.86	40.54	10.462	1974.3	3125.6	3270	4577
12869.8	0.125	29.98	44.98	32.48	92.46	7.49	23.740	1299.4	4135.8	4498	8746
8273.3	0.086	13.86	19.06	12.12	112.62	1.73	15.160	926.9	1576.7	1299	2166
3318.6	0.160	23.99	11.19	11.19	33.58	1.60	10.795	1791.2	2015.2	800	1200
6762.3	0.000*	12.29	34.83	16.39	59.42	2.05	2.049	1577.8	2295.0	1537	2254
8040.1	95.975	113.95	43.05	49.38	96.22	25.32	17.093	1949.3	5988.9	4432	7217
14799.9	11.269	58.38	63.81	46.16	95.04	12.22	32.587	2091.0	4670.8	4345	8011
22494.3	16.216	36.61	65.39	70.62	149.09	19.61	23.540	2733.3	3884.2	4970	7978
7467.8	3.665	3.66	21.99	14.66	71.47	3.66	14.202	1337.8	2025.0	1191	2291
4510.2	1.819	74.28	10.61	9.09	50.03	1.51	5.306	1318.9	4267.7	1364	3260
8521.5	16.493	15.39	24.19	20.89	98.96	[illegible]	[illegible]	1473.4	[illegible]	1759	[illegible]
12250.1	2.722	0.00*	71.63	57.31	126.08	12.89	28.455	2965.8	4814.0	3152	8127
21716.3	4.474	13.16	84.23	57.91	126.35	26.32	23.032	2724.4	4606.4	4475	7897
17524.6	7.585	0.00*	65.39	62.77	130.78	10.46	28.118	2707.1	4577.3	5885	[illegible]
7299.5	0.000*	2.30	33.33	22.99	105.75	5.89	22.416	3540.5	5279.8	[illegible]	[illegible]
21917.8	1.073	0.00*	16.86	13.79	33.72	1.53	4.598	1503.0	[illegible]	1316	[illegible]
8392.4	2.453	5.16	82.63	12.91	103.29	12.91	3.873	2169.1	1768.3	1808	[illegible]

A

TABLE A-4

THIS TABULATION IS THE RANKED
FLOW IS IN MILLION GALLON

RANDOM GRAB SURVEY - IN

ID	PLOT	FLOW	PLOT	PH	PLOT	ALK	PLOT	ACID	PLOT	[illegible]	PLOT	[illegible]	PLOT	[illegible]	PLOT	SS	PLOT	VSS	PLOT	OIL	PLOT	CN-
001	0.023	8.7	0.023	6.0	0.023	0	0.023	0	0.023	[illegible]	0.023	[illegible]	0.023	26309	0.023	1599	0.024	7677	0.023	2601.6	0.031	0.085
C	0.047	9.1	0.047	6.2	0.047	0	0.047	0	0.047	21636	0.047	33490	0.047	40770	0.047	8530	0.048	8420	0.047	3318.6	0.062	0.086
003	0.070	9.2	0.070	6.2	0.070	0	0.070	0	0.070	23741	0.070	35578	0.070	45807	0.070	16397	0.071	12705	0.070	4028.1	0.094	0.125
004	0.093	9.6	0.093	6.3	0.093	0	0.093	0	0.093	[illegible]	0.093	30708	0.093	49260	0.093	17760	0.095	14208	0.093	4510.7	0.125	0.125
005	0.116	9.7	0.116	6.3	0.116	0	0.116	0	0.116	25503	0.116	33200	0.116	67293	0.116	28362	0.119	15161	0.116	5151.6	0.156	0.130
006	0.140	10.2	0.140	6.4	0.140	0	0.140	0	0.140	27189	0.140	36285	0.140	67655	0.140	28514	0.143	16813	0.140	5352.8	0.187	0.144
007	0.163	10.2	0.163	6.5	0.163	0	0.163	0	0.163	28199	0.163	36285	0.163	72056	0.163	29808	0.167	17560	0.163	5847.6	0.219	0.160
008	0.186	10.4	0.186	6.5	0.186	0	0.186	0	0.186	29413	0.186	38909	0.186	77579	0.186	31967	0.190	18693	0.186	5869.3	0.250	0.175
009	0.209	10.5	0.209	6.6	0.209	0	0.209	0	0.209	29755	0.209	43652	0.209	85307	0.209	33050	0.214	19032	0.209	5927.2	0.281	0.221
010	0.233	11.0	0.233	6.7	0.233	0	0.233	0	0.233	34003	0.233	50980	0.233	86499	0.233	35686	0.238	21691	0.233	6762.3	0.312	0.329
011	0.256	11.0	0.256	6.8	0.256	0	0.256	0	0.256	35386	0.256	51859	0.256	86530	0.256	36385	0.262	21925	0.256	6776.0	0.344	0.354
012	0.279	12.3	0.279	6.8	0.279	0	0.279	0	0.279	35536	0.279	52104	0.279	87184	0.279	37752	0.286	22158	0.279	6822.2	0.375	0.764
013	0.302	12.8	0.302	6.8	0.302	0	0.302	0	0.302	35613	0.302	52846	0.302	91024	0.302	39424	0.310	24863	0.302	6872.2	0.406	1.073
014	0.326	13.0	0.326	6.9	0.326	0	0.326	0	0.326	37225	0.326	54578	0.326	91026	0.326	41317	0.333	25940	0.326	7299.5	0.437	1.307
015	0.349	13.0	0.349	6.9	0.349	0	0.349	0	0.349	37425	0.349	55088	0.349	91630	0.349	43143	0.357	26023	0.349	7347.0	0.469	1.819
016	0.372	13.0	0.372	6.9	0.372	0	0.372	0	0.372	38235	0.372	55658	0.372	92143	0.372	43223	0.381	26989	0.372	7467.8	0.500	1.994
017	0.395	13.2	0.395	7.0	0.395	0	0.395	0	0.395	42583	0.395	56052	0.395	94992	0.395	44862	0.405	27636	0.395	8040.1	0.531	2.453
018	0.419	13.2	0.419	7.0	0.419	0	0.419	0	0.419	42737	0.419	65298	0.419	97711	0.419	46781	0.429	28069	0.419	8273.3	0.562	2.722
019	0.442	13.3	0.442	7.0	0.442	0	0.442	0	0.442	44837	0.442	66273	0.442	97894	0.442	46981	0.452	28149	0.442	8369.1	0.594	3.118
020	0.465	13.3	0.465	7.0	0.465	0	0.465	0	0.465	45177	0.465	[illegible]	0.465	99302	0.465	49260	0.476	29108	0.465	8392.4	0.625	3.665
021	0.488	13.8	0.488	7.0	0.488	0	0.488	0	0.488	47901	0.488	69332	0.488	99960	0.488	49380	0.500	29468	0.488	8521.5	0.656	3.758
022	0.512	14.2	0.512	7.0	0.512	0	0.512	0	0.512	48081	0.512	69812	0.512	103798	0.512	59030	0.524	29628	0.512	8746.5	0.687	4.474
023	0.535	14.3	0.535	7.0	0.535	0	0.535	0	0.535	48176	0.535	70622	0.535	105629	0.535	61745	0.548	29806	0.535	9295.0	0.719	7.585
024	0.558	15.0	0.558	7.0	0.558	0	0.558	0	0.558	49690	0.558	70697	0.558	105691	0.558	65714	0.571	34003	0.558	9451.2	0.750	11.269
0	0.581	15.0	0.581	7.0	0.581	0	0.581	0	0.581	50220	0.581	71361	0.581	109119	0.581	67443	0.595	35866	0.581	9671.1	0.781	11.955
026	0.605	15.2	0.605	7.0	0.605	0	0.605	0	0.605	50420	0.605	72571	0.605	109756	0.605	67483	0.619	36385	0.605	10789.6	0.812	16.216
027	0.628	15.5	0.628	7.0	0.628	0	0.628	250	0.628	50940	0.628	73046	0.628	115287	0.628	76149	0.643	36385	0.628	11040.5	0.844	16.493
028	0.651	15.6	0.631	7.0	0.651	0	0.651	262	0.651	51979	0.651	73071	0.651	121631	0.651	76219	0.667	38045	0.651	11095.5	0.875	24.390
029	0.674	15.6	0.674	7.0	0.674	0	0.674	277	0.674	52359	0.674	73881	0.674	130954	0.674	78402	0.690	39584	0.674	11635.3	0.906	27.589
030	0.698	15.6	0.698	7.0	0.698	0	0.698	347	0.698	55488	0.698	74150	0.698	131304	0.698	79008	0.714	41850	0.698	12162.6	0.937	29.368
031	0.721	15.7	0.721	7.0	0.721	0	0.721	367	0.721	55707	0.721	76520	0.721	133197	0.721	80561	0.738	44982	0.721	12250.1	0.969	95.975
032	0.744	15.7	0.744	7.1	0.744	152	0.744	433	0.744	57067	0.744	[illegible]	0.744	134704	0.744	93096	0.762	48780	0.744	12869.8	0.000	0.000*
033	0.767	15.7	0.767	7.1	0.767	213	0.767	525	0.767	59655	0.767	[illegible]	0.767	148660	0.767	98401	0.786	49287	0.767	13470.4	0.000	0.000*
034	0.791	15.7	0.791	7.1	0.791	230	0.791	2092	0.791	60176	0.791	79324	0.791	149190	0.791	100760	0.810	53978	0.791	13644.5	0.000	0.000*
C35	0.814	15.8	0.814	7.1	0.814	289	0.814	2599	0.814	63958	0.814	83463	0.814	163598	0.814	100853	0.833	58113	0.814	14799.9	0.000	0.000*
C36	0.837	16.3	0.837	7.4	0.837	2869	0.837	2639	0.837	66490	0.837	78886	0.837	164384	0.837	121978	0.857	58243	0.837	16441.7	0.000	0.000*
037	0.860	17.2	0.860	7.4	0.860	3335	0.860	3039	0.860	70087	0.860	97461	0.860	170131	0.860	135489	0.881	61205	0.860	17524.6	0.000	0.000*
038	0.884	17.3	0.884	7.4	0.884	4385	0.884	3324	0.884	[illegible]	0.884	101634	0.884	172941	0.884	153938	0.905	65294	0.884	18701.6	0.000	0.000*
C39	0.907	17.3	0.907	8.0	0.907	4958	0.907	3354	0.907	73323	0.907	103498	0.907	195484	0.907	168366	0.929	78992	0.907	20463.4	0.000	0.000*
040	0.930	18.0	0.930	8.0	0.936	6697	0.930	3955	0.930	94967	0.930	127508	0.930	[illegible]	0.930	180348	0.952	102132	0.930	21716.3	0.000	0.000*
041	0.953	18.3	0.953	8.6	0.953	9421	0.953	5098	0.953	110356	0.953	149492	0.953	213394	0.953	239537	0.976	106011	0.953	21917.8	0.000	0.000*
042	0.977	18.8	0.977	8.8	0.977	23091	0.977	6647	0.977	202419	0.977	237144	0.977	361739	0.977	325906	0.000	0*	0.977	22494.3	0.000	0.000*
	MEAN	13.7		7.6		1320		838		11075.		75113		11329		76776		36362		10325.7		8.707
	STD DEV	2.7		.5		3995		1615		37399		1088		3751		63246		23399		5739.7		14.279

*=NO ANALYSIS

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TABLE A-4

LATION IS THE RANKED EXTENDED DATA
* IS IN MILLION GALLONS PER DAY

ANDOM GRAB SURVEY - INFLUENT

	PLOT	CN-	PLOT	PHENOL	PLOT	TOT CR	PLOT	COPPER	PLOT	ZINC	PLOT	CADM	PLOT	NICKEL	PLOT	NH3-N	PLOT	ORG-N	PLOT	PO4-O	PLOT	PO4TOT
1.6	0.031	0.085	0.026	0.80	0.023	10.19	0.023	9.09	0.023	18.11	0.023	1.51	0.031	2.049	0.023	864.1	0.023	979.6	0.023	727	0.023	1200
8.6	0.062	0.086	0.053	0.91	0.047	10.61	0.047	10.66	0.047	18.12	0.047	1.53	0.062	2.215	0.047	913.1	0.047	1174.3	0.047	800	0.047	1599
8.3	0.094	0.125	0.079	2.30	0.070	10.87	0.070	11.07	0.070	23.8[illegible]	0.070	1.60	0.094	3.873	0.070	926.9	0.070	1576.7	0.070	886	0.070	1778
0.2	0.125	0.125	0.105	3.66	0.093	11.19	0.093	11.19	0.093	33.57	0.093	1.61	0.125	4.598	0.093	960.1	0.093	1579.8	0.093	1066	0.093	1883
1.6	0.156	0.130	0.132	5.16	0.116	12.99	0.116	11.59	0.116	33.58	0.116	1.70	0.156	5.198	0.116	1085.7	0.116	1628.6	0.116	1105	0.116	2166
2.8	0.187	0.144	0.158	5.19	0.140	14.92	0.140	12.12	0.140	33.72	0.140	1.73	0.187	5.248	0.140	1172.0	0.140	1768.8	0.140	1191	0.140	2254
7.6	0.219	0.160	0.184	7.84	0.163	15.16	0.163	12.91	0.163	35.55	0.163	1.75	0.219	5.306	0.163	1244.3	0.163	1801.2	0.163	1299	0.163	2291
9.3	0.250	0.175	0.211	10.87	0.186	16.16	0.186	13.59	0.186	42.48	0.186	2.05	0.250	5.847	0.186	1299.4	0.186	1809.9	0.186	1364	0.186	3189
7.2	0.281	0.221	0.237	10.96	0.209	16.49	0.209	13.79	0.209	50.03	0.209	2.13	0.281	10.462	0.209	1308.4	0.209	1946.5	0.209	1449	0.209	3260
2.3	0.312	0.329	0.263	12.29	0.233	16.61	0.233	14.66	0.233	50.68	0.233	2.16	0.312	10.795	0.233	1318.9	0.233	2015.2	0.233	1537	0.233	3261
76.0	0.344	0.354	0.289	12.74	0.256	16.86	0.256	15.16	0.256	59.14	0.256	2.16	0.344	12.320	0.256	1337.8	0.256	2025.0	0.256	1759	0.256	3399
2.2	0.375	0.764	0.316	13.16	0.279	18.74	0.279	15.69	0.279	59.42	0.279	2.17	0.375	12.745	0.279	1417.5	0.279	2295.0	0.279	1808	0.279	3499
2.2	0.406	1.073	0.342	13.86	0.302	19.06	0.302	15.74	0.302	61.07	0.302	2.21	0.406	13.698	0.302	1429.4	0.302	2324.4	0.302	1916	0.302	3832
49.5	0.437	1.307	0.368	14.87	0.326	19.24	0.326	16.39	0.326	62.04	0.326	3.39	0.437	14.202	0.326	1429.4	0.326	2616.9	0.326	2105	0.326	4368
7.0	0.469	1.819	0.395	15.39	0.349	19.49	0.349	16.96	0.349	63.77	0.349	3.66	0.469	15.160	0.349	1473.4	0.349	2660.9	0.349	2162	0.349	4390
7.8	0.500	1.994	0.421	15.99	0.372	21.99	0.372	16.99	0.372	64.57	0.372	3.74	0.500	15.593	0.372	1502.0	0.372	2693.9	0.372	2366	0.372	4577
0.1	0.531	2.453	0.447	16.24	0.395	22.47	0.395	20.89	0.395	68.22	0.395	3.89	0.531	17.093	0.395	1503.4	0.395	2767.9	0.395	2529	0.355	4731
73.3	0.562	2.722	0.474	16.76	0.419	24.19	0.419	22.99	0.419	71.47	0.419	5.19	0.562	17.243	0.419	1577.8	0.419	2999.6	0.419	2599	0.419	4948
9.1	0.594	3.118	0.500	19.49	0.442	25.48	0.442	24.90	0.442	81.00	0.442	5.54	0.594	19.575	0.442	1695.1	0.442	3007.9	0.442	2639	0.442	5956
2.4	0.625	3.665	0.526	20.57	0.465	25.99	0.465	28.58	0.465	91.54	0.465	5.76	0.625	19.617	0.465	1726.9	0.465	3011.8	0.465	2711	0.465	5956
1.5	0.656	3.758	0.553	23.65	0.488	28.58	0.488	32.48	0.488	92.46	0.488	5.91	0.656	20.496	0.488	1759.3	0.488	3097.1	0.488	2882	0.488	6485
6.5	0.687	4.474	0.579	23.82	0.512	32.16	0.512	32.48	0.512	95.04	0.512	5.95	0.687	22.416	0.512	1791.2	0.512	3125.6	0.512	3032	0.512	7039
5.0	0.719	7.585	0.605	23.99	0.535	33.33	0.535	34.30	0.535	95.29	0.535	6.49	0.719	22.865	0.535	1819.2	0.535	3262.7	0.535	3152	0.535	7039
1.2	0.750	11.269	0.632	27.38	0.558	34.83	0.558	39.88	0.558	96.22	0.558	6.49	0.750	23.032	0.558	1923.2	0.558	3417.6	0.558	3270	0.558	7204
1.1	0.781	11.955	0.658	28.80	0.581	36.81	0.581	41.69	0.581	97.12	0.581	6.59	0.781	23.540	0.581	1949.8	0.581	3454.4	0.581	3379	0.581	7217
5.6	0.812	16.216	0.684	29.23	0.605	38.23	0.605	42.88	0.605	98.96	0.605	6.89	0.812	23.740	0.605	1974.8	0.605	3703.5	0.605	3482	0.605	7580
0.5	0.844	16.493	0.711	29.98	0.628	38.91	0.628	43.85	0.628	99.71	0.628	7.49	0.844	26.389	0.628	2053.2	0.628	3729.5	0.628	3574	0.628	7872
5.5	0.875	24.390	0.737	34.08	0.651	39.40	0.651	46.16	0.651	103.29	0.651	8.24	0.875	28.118	0.651	2054.1	0.651	3862.1	0.651	3915	0.651	7897
5.3	0.906	27.589	0.763	36.61	0.674	43.05	0.674	48.73	0.674	105.75	0.674	10.46	0.906	28.655	0.674	2091.0	0.674	3884.2	0.674	3998	0.674	7978
2.6	0.937	29.368	0.789	42.88	0.698	44.46	0.698	49.38	0.698	1[illegible].05	0.698	10.99	0.937	32.587	0.698	2169.1	0.698	4135.8	0.698	4116	0.698	8011
.1	0.969	95.975	0.816	58.38	0.721	44.98	0.721	49.98	0.721	110.95	0.721	11.52	0.969	38.188	0.721	2260.1	0.721	4165.6	0.721	4169	0.721	8167
9.8	0.000	0.000*	0.842	67.73	0.744	59.45	0.744	51.98	0.744	112.40	0.744	11.99	0.000	0.000*	0.744	2262.5	0.744	4237.8	0.744	4198	0.744	8447
.4	0.000	0.000*	0.868	74.28	0.767	63.31	0.767	53.62	0.767	112.45	0.767	12.22	0.000	0.000*	0.767	2533.9	0.767	4267.7	0.767	4332	0.767	8746
4.5	0.000	0.000*	0.895	79.77	0.791	65.39	0.791	56.20	0.791	112.62	0.791	12.89	0.000	0.000*	0.791	2666.0	0.791	4548.1	0.791	4345	0.791	9155
.9	0.000	0.000*	0.921	80.96	0.814	65.39	0.814	56.81	0.814	112.80	0.814	12.91	0.000	0.000*	0.814	2707.1	0.814	4577.3	0.814	4432	0.814	9195
1.7	0.000	0.000*	0.947	93.13	0.837	68.90	0.837	57.31	0.837	126.08	0.837	15.24	0.000	0.000*	0.837	2713.4	0.837	4606.4	0.837	4475	0.837	9367
4.6	0.000	0.000*	0.974	113.95	0.860	71.63	0.860	57.91	0.860	126.35	0.860	15.66	0.000	0.000*	0.860	2724.4	0.860	4670.8	0.860	4498	0.860	9909
1.6	0.000	0.000*	0.000	0.00*	0.884	74.54	0.884	62.77	0.884	126.81	0.884	[illegible].61	0.000	0.000*	0.884	2728.9	0.884	4814.0	0.884	4548	0.884	10136
3.4	0.000	0.000*	0.000	0.00*	0.907	77.96	0.907	62.97	0.907	130.78	0.907	[illegible]	0.000	0.000*	0.907	2733.3	0.907	5247.9	0.907	4970	0.907	10496
6.3	0.000	0.000*	0.000	0.00*	0.930	82.63	0.930	70.62	0.930	143.86	0.930	[illegible]	0.000	0.000*	0.930	2765.8	0.930	5379.8	0.930	5885	0.930	10593
7.8	0.000	0.000*	0.000	0.00*	0.953	84.23	0.953	72.05	0.953	149.09	0.953	26.[illegible]	0.000	0.000*	0.953	3073.7	0.953	5988.9	0.953	6277	0.953	12085
4.3	0.000	0.000*	0.000	0.00*	0.977	198.87	0.977	76.22	0.977	183.22	0.977	40.5[illegible]	0.000	0.000*	0.977	3540.5	0.977	6822.2	0.977	15294	0.977	19542
5.7		8.707		29.40		39.91		34.65		84.79		8.4		16.221		1873.3		3278.2		3244		6397
9.7		18.279		28.18		33.74		20.56		38.72		9.22		9.46[illegible]		665.5		1356.7		2382		3597

A

NOT REPRODUCIBLE

TABLE

THIS TABULATION IS THE RA
FLOW IS IN MILLION
CONCENTRATIONS ARE IN M

METROPOLITAN S.T.

ID	DATE	TIME	FLOW	PH	ALK	ACID	[illegible]	BODUC	COD	SS	VSS	OIL	PH
519	09 03 68	1700	50.0	6.2	0	52.0	144	183	317	146	112	0.0*	0.0
520	09 03 68	2300	41.0	6.3	0	40.0	114	135	248	138	98	0.0*	0.0
521	09 04 68	0600	21.0	6.7	0	30.0	105	124	158	54	36	0.0*	0.0
522	09 04 68	0900	47.0	6.8	0	0.0	102	144	277	187	160	0.0*	[illegible]
523	09 04 68	1320	59.5	6.5	0	37.5	105	159	515	322	220	55.5	0.1
526	09 04 68	1900	44.0	6.5	0	16.0	96	132	218	122	100	19.7	[illegible]
527	09 05 68	0100	40.5	6.6	0	16.0	93	117	210	112	90	0.0*	0.0
532	09 05 68	1400	58.5	6.3	0	54.0	144	192	453	232	184	0.0*	[illegible]
[illegible]	09 05 68	1600	45.5	6.5	0	16.0	90	120	267	[illegible]	52	22.1	0.0
535	09 05 68	2300	45.5	6.4	0	30.0	108	144	297	150	126	0.0*	[illegible]
537	09 06 68	0300	44.5	6.5	0	20.0	72	106	[illegible]	118	88	0.0*	[illegible]
541	09 06 68	1100	76.0	7.0	0	0.0	138	174	277	156	84	47.6	< [illegible]
542	09 06 68	1600	46.0	6.8	0	.0	132	174	277	216	170	0.0*	0.0
543	09 06 68	2000	51.5	6.8	0	.0	81	96	255	100	84	0.0*	0.0
544	09 07 68	0300	34.0	6.7	0	12.0	66	102	128	50	44	25.9	[illegible]
545	09 07 68	0700	33.5	7.0	0	0.0	66	69	69	42	34	0.0*	0.0
546	09 07 68	1500	51.0	6.9	0	4.0	120	162	255	134	110	0.0*	0.0
547	09 07 68	2100	44.5	6.8	0	5.0	99	126	333	114	110	0.0*	0.0
548	09 08 68	0400	32.5	6.8	0	3.0	36	78	88	38	38	4.7	0.0
549	09 08 68	1000	36.5	7.0	0	0.0	30	60	79	40	38	0.0*	0.0
550	09 08 68	1400	45.0	6.9	0	4.0	114	177	353	136	128	0.0*	[illegible]
551	09 08 68	2400	42.0	6.8	0	5.0	90	123	226	96	90	28.7	0.0
552	09 09 68	0600	30.0	6.6	0	0.0	42	54	59	14	10	0.0*	.0
553	09 09 68	1100	55.5	7.0	0	0.0	171	270	354	168	156	0.0*	0.0
554	09 09 68	1430	49.5	7.2	8	0.0	193	234	314	162	122	40.9	.0
555	09 09 68	2200	47.0	6.8	0	0.0	153	183	401	174	158	0.0*	0.0
556	09 10 68	0100	26.0	7.0	0	0.0	72	129	216	146	132	0.0*	0.0
557	09 10 68	0800	34.0	6.8	0	0.0	36	54	69	52	44	0.0*	< [illegible]

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*= NO ANALYSIS

B

TABLE A-5

THE RAW DATA FROM THE SURVEY
ILLION GALLONS PER DAY
RE IN MILLIGRAMS PER LITER

S.T.P. INFLUENT

	PHENOL	CN	CU	ZN	NI	CD	CR	O-PO4	T-PO4	NH3-N	ORG-N	FLOW
0*	0.000*	0.035	0.150	0.63	0.14	<0.05	0.20	28.2	38.0	8.4	0.0	50.0
0*	0.000*	<0.010	0.115	0.29	0.11	<0.05	1.90	24.3	51.6	9.8	2.8	41.0
0*	0.000*	0.040	0.062	0.15	<0.05	<0.05	0.09	9.3	15.0	5.6	5.6	21.0
0*	0.000*	0.021	0.325	0.32	<0.05	<0.05	0.13	15.1	50.0	8.4	8.4	47.0
5	0.140	<0.010	0.250	0.68	0.08	<0.05	0.34	30.3	62.5	15.8	7.0	59.5
7	0.050	0.016	0.110	0.24	0.06	<0.05	0.34	23.6	[illegible]	9.8	2.4	48.0
0*	0.000*	0.055	0.110	2.22	<0.05	<0.05	0.12	16.4	36.5	8.4	4.5	40.5
0*	0.000*	<0.010	0.165	2.02	0.10	<0.05	0.34	27.2	41.5	9.0	10.6	58.5
1	0.025	0.071	0.145	0.41	0.26	<0.05	0.37	17.2	45.0	7.0	7.0	48.5
0*	0.000*	<0.010	0.105	0.29	0.10	<0.05	0.17	16.4	[illegible]	9.2	8.7	45.5
0*	0.000*	<0.010	0.095	0.34	<0.05	<0.05	0.14	9.8	24.6	8.1	4.9	54.5
6	<0.010	<0.010	0.170	0.52	0.08	<0.05	0.21	13.4	17.4	7.5	8.1	76.0
0*	0.000*	0.000*	0.000*	0.00*	0.00*	<0.00*	0.00*	22.0	150.0	4.0	7.7	46.0
0*	0.000*	0.022	0.112	0.22	0.18	<0.05	0.25	18.2	50.0	6.9	0.7	51.5
9	0.025	<0.010	0.070	0.09	0.11	<0.05	0.11	7.8	11.2	4.9	4.9	34.0
0*	0.000*	0.266	0.040	0.11	<0.05	<0.05	0.14	4.7	7.0	8.4	3.9	33.5
0*	0.000*	0.022	0.105	0.25	0.06	<0.05	0.11	39.0	51.5	10.9	2.1	51.0
0*	0.000*	0.036	0.112	0.21	0.10	<0.05	0.11	25.6	37.5	9.8	1.4	44.5
7	0.000*	0.021	0.075	0.13	0.08	<0.05	0.14	9.4	15.0	9.1	2.2	32.5
0*	0.000*	0.023	0.070	0.12	0.06	<0.05	0.12	6.6	10.4	7.3	5.3	36.5
0*	0.000*	<0.010	0.093	0.15	0.10	<0.05	0.09	26.2	61.5	14.0	9.0	45.0
7	0.025	<0.010	0.105	0.13	0.05	<0.05	0.16	18.5	7.0	10.5	6.7	42.0
*	0.000*	0.035	0.045	0.07	<0.05	<0.05	0.10	4.5	6.2	4.9	2.4	30.0
0*	0.000*	0.056	0.222	0.37	0.06	<0.05	0.23	23.9	28.4	17.1	9.7	55.5
9	0.020	0.017	0.240	0.40	0.15	<0.05	1.32	21.5	46.6	7.3	9.3	48.5
0*	0.000*	<0.010	0.130	0.75	0.06	<0.05	0.27	20.8	34.5	5.4	7.3	47.0
0*	0.000*	<0.010	0.030	0.22	<0.05	<0.05	0.15	18.5	30.4	8.1	6.3	26.0
0*	<0.010	<0.010	0.062	0.32	<0.05	<0.05	0.10	7.8	19.8	4.9	3.6	34.0

A

THIS TABULATION
FLOW IS IN MIL

METROPOLITAN

PLOT FLOW		PLOT PH		PLOT ALK		PLOT ACIDITY		PLOT [illegible]		PLOT BODUC		PLOT COD		PLOT SS		PLOT VSS		PLOT OIL		PLOT PHENOL
0.034	[illegible]	0.034	6.7	0.034	0	0.034	0.0	0.034	[illegible]	0.034	54	0.034	59	0.034	14	0.034	10	0.111	4.7	0.111	0.01
0.069	[illegible]	0.069	6.7	0.069	0	0.069	0.0	0.069	[illegible]	0.069	54	0.069	69	0.069	38	0.069	34	0.222	19.7	0.222	0.01
0.103	3?.0	0.103	6.?	0.103	0	0.103	0.0	0..03	56	0.103	60	0.103	79	0.103	40	0.103	36	0.333	22.1	0.333	0.02
0.138	[illegible]	0.138	6.?	0.138	0	0.138	0.0	0.138	47	0.138	69	0.138	89	0.138	42	0.138	36	0.444	25.9	0.444	0.02
0.172	33.5	0.172	6.4	0.172	0	0.172	0.0	0.172	56	0.172	78	0.172	89	0.172	50	0.172	38	0.556	28.7	0.556	0.02
0.207	34.0	0.207	6.5	0.207	0	0.207	0.0	0.207	6?	0.207	96	0.207	128	0.207	52	0.207	44	0.667	40.9	0.667	0.0?
0.241	34.0	0.241	6.?	0.241	0	0.241	4.0	0.241	72	0.241	102	0.241	158	0.241	54	0.241	44	0.778	47.6	0.778	0.05
0.276	[illegible]	0.276	6.?	0.276	0	0.276	4.0	0.276	7?	0.276	10?	0.276	216	0.276	80	0.276	62	0.889	55.5	0.889	0.14
0.310	40.?	0.310	6.6	0.310	0	0.310	8.0	0.310	81	0.310	117	0.310	218	0.310	96	0.310	84	0.000	0.0*	0.000	0.00
0.345	41.0	0.345	6.?	0.345	0	0.345	8.0	0.345	90	0.345	120	0.345	218	0.345	100	0.345	84	0.000	0.0*	0.000	0.00
0.379	4?.0	0.379	6.7	0.379	0	0.379	8.0	0.379	9?	0.379	123	0.379	226	0.379	112	0.379	88	0.000	0.0*	0.000	0.00
0.414	44.?	0.414	6.?	0.414	0	0.414	8.0	0.414	9?	0.414	124	0.414	248	0.414	114	0.414	90	0.000	0.0*	0.000	0.00
0.448	45.?	0.448	6.8	0.448	0	0.448	8.0	0.448	96	0.448	126	0.448	255	0.448	118	0.448	90	0.000	0.0*	0.000	0.00
0.483	45.?	0.483	6.8	0.483	0	0.483	8.0	0.483	99	0.483	129	0.483	255	0.483	122	0.483	98	0.000	0.0*	0.000	0.00
0.517	46.0	0.517	6.8	0.517	0	0.517	8.0	0.517	102	0.517	132	0.517	267	0.517	134	0.517	100	0.000	0.0*	0.000	0.00
0.552	47.0	0.552	6.8	0.552	0	0.552	8.0	0.552	10?	0.552	135	0.552	277	0.552	136	0.552	110	0.000	0.0*	0.000	0.00
0.586	47.0	0.586	6.8	0.586	0	0.586	8.0	0.586	108	0.586	144	0.586	277	0.586	136	0.586	110	0.000	0.0*	0.000	0.00
0.621	4?.0	0.621	6.?	0.621	0	0.621	12.0	0.621	10?	0.621	144	0.621	277	0.621	138	0.621	112	0.000	0.0*	0.000	0.00
0.655	48.5	0.655	6.8	0.655	0	0.655	16.0	0.655	114	0.655	159	0.655	297	0.655	148	0.655	122	0.000	0.0*	0.000	0.00
0.690	48.?	0.690	6.?	0.690	0	0.690	16.0	0.690	116	0.690	162	0.690	317	0.690	150	0.690	126	0.000	0.0*	0.000	0.00
0.724	50.?	0.724	6.9	0.724	0	0.724	16.0	0.724	120	0.724	174	0.724	324	0.724	156	0.724	128	0.000	0.0*	0.000	0.00
0.759	51.0	0.759	6.9	0.759	0	0.759	20.0	0.759	132	0.759	174	0.759	333	0.759	162	0.759	132	0.000	0.0*	0.000	0.00
0.793	51.?	0.793	7.0	0.793	0	0.793	20.0	0.793	138	0.793	177	0.793	353	0.793	168	0.793	156	0.000	0.0*	0.000	0.00
0.828	54.5	0.828	7.0	0.828	0	0.828	30.0	0.828	144	0.828	183	0.828	353	0.828	174	0.828	158	0.000	0.0*	0.000	0.00
0.862	55.5	0.862	7.0	0.862	0	0.862	37.5	0.862	144	0.862	183	0.862	401	0.862	187	0.862	160	0.000	0.0*	0.000	0.00
0.897	56.5	0.897	7.0	0.897	0	0.897	40.0	0.897	153	0.897	192	0.897	455	0.897	216	0.897	170	0.000	0.0*	0.000	0.00
0.931	59.0	0.931	7.0	0.931	0	0.931	52.0	0.931	171	0.931	234	0.931	485	0.931	232	0.931	184	0.000	0.0*	0.000	0.00
0.966	76.0	0.966	7.2	0.966	0	0.966	54.0	0.966	18?	0.966	270	0.966	51?	0.966	322	0.966	220	0.000	0.0*	0.000	0.00
MEAN	44.?		6.7				14.4		100		137		258		125		101		30.6		.03
STD DEV	11.6		.2		?		15.?		4?		52		123		68		52		16.4		.04

*= NO ANALYSIS

B

TABLE A-

THIS TABULATION IS THE RANKED RAW DATA
FLOW IS IN MILLION GALLONS PER DAY

METROPOLITAN S.T.P. INFLUENT

OT	OIL	PLOT	PHENOL	PLOT	CN	PLOT	CU	PLOT	ZN	PLOT	NI	PLOT	CD	PLOT	CR	PLOT	O-PO4	PLOT	T-PO4	PLOT	NH3-N	PLOT	ORG-N
11	4.7	0.111	0.010	0.036	0.010	0.036	0.040	0.036	0.07	0.036	0.05	0.036	0.05	0.036	0.09	0.034	4.5	0.034	6.2	0.034	4.0	0.034	0.0
22	19.7	0.222	0.010	0.071	0.010	0.071	0.045	0.071	0.09	0.071	0.05	0.071	0.05	0.071	0.09	0.069	4.7	0.069	7.0	0.069	4.9	0.069	0.7
33	22.1	0.333	0.020	0.107	0.010	0.107	0.062	0.107	0.11	0.107	0.05	0.107	0.05	0.107	0.10	0.103	6.6	0.103	10.4	0.103	4.9	0.103	1.4
44	25.9	0.444	0.025	0.143	0.010	0.143	0.062	0.143	0.12	0.143	0.05	0.143	0.05	0.143	0.10	0.138	7.8	0.138	11.2	0.138	4.9	0.138	2.1
56	28.7	0.556	0.025	0.179	0.010	0.179	0.070	0.179	0.13	0.179	0.05	0.179	0.05	0.179	0.11	0.172	7.8	0.172	15.0	0.172	5.6	0.172	2.2
67	40.9	0.667	0.025	0.214	0.010	0.214	0.070	0.214	0.13	0.214	0.05	0.214	0.05	0.214	0.11	0.207	9.3	0.207	17.4	0.207	6.9	0.207	2.4
78	47.6	0.778	0.050	0.250	0.010	0.250	0.075	0.250	0.15	0.250	0.05	0.250	0.05	0.250	0.11	0.241	9.4	0.241	19.8	0.241	7.0	0.241	2.4
89	55.5	0.889	0.140	0.286	0.010	0.286	0.090	0.286	0.18	0.286	0.05	0.286	0.05	0.286	0.12	0.276	9.8	0.276	24.6	0.276	7.3	0.276	2.8
000	0.0*	0.000	0.000*	0.321	0.010	0.321	0.093	0.321	0.21	0.321	0.05	0.321	0.05	0.321	0.12	0.310	13.4	0.310	25.0	0.310	7.3	0.310	3.6
00	0.0*	0.000	0.000*	0.357	0.010	0.357	0.095	0.357	0.22	0.357	0.06	0.357	0.05	0.357	0.14	0.345	15.1	0.345	27.0	0.345	7.3	0.345	3.9
000	0.0*	0.000	0.000*	0.393	0.010	0.393	0.105	0.393	0.22	0.393	0.06	0.393	0.05	0.393	0.14	0.379	16.4	0.379	28.4	0.379	8.1	0.379	4.5
000	0.0*	0.000	0.000*	0.429	0.010	0.429	0.105	0.429	0.24	0.429	0.06	0.429	0.05	0.429	0.14	0.414	17.2	0.414	29.0	0.414	8.1	0.414	4.9
00	0.0*	0.000	0.000*	0.464	0.016	0.464	0.105	0.464	0.25	0.464	0.06	0.464	0.05	0.464	0.15	0.448	18.2	0.448	30.0	0.448	8.4	0.448	4.9
000	0.0*	0.000	0.000*	0.500	0.017	0.500	0.110	0.500	0.25	0.500	0.08	0.500	0.05	0.500	0.16	0.483	18.4	0.483	30.4	0.483	8.4	0.483	5.3
00	0.0*	0.000	0.000*	0.536	0.021	0.536	0.110	0.536	0.29	0.536	0.08	0.536	0.05	0.536	0.17	0.517	18.5	0.517	34.8	0.517	8.4	0.517	5.6
000	0.0*	0.000	0.000*	0.571	0.021	0.571	0.112	0.571	0.29	0.571	0.08	0.571	0.05	0.571	0.18	0.552	18.5	0.552	35.0	0.552	8.4	0.552	6.3
00	0.0*	0.000	0.000*	0.607	0.022	0.607	0.112	0.607	0.32	0.607	0.08	0.607	0.05	0.607	0.21	0.586	20.8	0.586	36.5	0.586	8.4	0.586	6.7
00	0.0*	0.000	0.000*	0.643	0.022	0.643	0.115	0.643	0.32	0.643	0.10	0.643	0.05	0.643	0.23	0.621	21.5	0.621	37.5	0.621	9.0	0.621	7.0
00	0.0*	0.000	0.000*	0.679	0.025	0.679	0.130	0.679	0.34	0.679	0.10	0.679	0.05	0.679	0.25	0.655	22.0	0.655	38.0	0.655	9.1	0.655	7.0
00	0.0*	0.000	0.000*	0.714	0.035	0.714	0.145	0.714	0.37	0.714	0.10	0.714	0.05	0.714	0.27	0.690	23.6	0.690	41.5	0.690	9.2	0.690	7.3
00	0.0*	0.000	0.000*	0.750	0.036	0.750	0.150	0.750	0.40	0.750	0.10	0.750	0.05	0.750	0.30	0.724	23.9	0.724	46.6	0.724	9.8	0.724	7.7
00	0.0*	0.000	0.000*	0.786	0.038	0.786	0.165	0.786	0.41	0.786	0.11	0.786	0.05	0.786	0.34	0.759	24.3	0.759	50.0	0.759	9.8	0.759	8.1
000	0.0*	0.000	0.000*	0.821	0.040	0.821	0.170	0.821	0.52	0.821	0.11	0.821	0.05	0.821	0.34	0.793	25.6	0.793	51.5	0.793	9.8	0.793	8.4
000	0.0*	0.000	0.000*	0.857	0.055	0.857	0.222	0.857	0.63	0.857	0.14	0.857	0.05	0.857	0.34	0.828	26.7	0.828	51.6	0.828	10.5	0.828	8.7
000	0.0*	0.000	0.000*	0.893	0.158	0.893	0.240	0.893	0.68	0.893	0.15	0.893	0.05	0.893	0.37	0.862	27.2	0.862	55.0	0.862	10.9	0.862	9.0
000	0.0*	0.000	0.000*	0.929	0.171	0.929	0.250	0.929	2.07	0.929	0.18	0.929	0.05	0.929	1.52	0.897	28.2	0.897	61.5	0.897	14.0	0.897	9.3
000	0.0*	0.000	0.000*	0.964	0.266	0.964	0.325	0.964	2.22	0.964	0.20	0.964	0.05	0.964	1.90	0.931	30.3	0.931	62.5	0.931	15.8	0.931	9.7
000	0.0*	0.000	0.000*	0.000	0.000*	0.000	0.000*	0.000	0.00*	0.000	0.00*	0.000	0.00*	0.000	0.00*	0.966	39.0	0.966	150.0	0.966	17.1	0.966	10.6
	30.6		.038		.032		.125		.41		.04		.05		.30		18.1		36.9		8.7		5.4
	16.4		.043		.049		.067		.51		.05		.00		.42		8.6		27.2		3.0		2.9

A

TABLE A-7

THIS TABULATION IS THE DATA EXTEN
FLOW IS IN MILLION GALL

METROPOLITAN S.T.P. I

ID	DATE	TIME	FLOW	PH	ALK	ACID	BOD	MDUC	COD	SS	VSS	OIL	PHENO
519	09 03 68	1700	50.0	6.2	0	21658.0	59976	76219	132030	61642	46648	0.0*	0.00
520	09 03 68	2300	41.0	6.3	0	13661.2	38934	46107	84699	47131	33470	0.0*	0.00
521	09 04 68	0600	21.0	6.2	0	5247.9	18368	21691	27639	9446	6297	0.0*	0.00
522	09 04 68	0900	47.0	6.6	0	3132.0	39934	56277	108443	73212	62642	0.0*	0.00
523	09 04 68	1320	51.5	6.5	0	18586.3	53529	78506	255252	159594	109040	27507.7	69.38
526	09 04 68	1900	45.0	6.6	0	6397.4	38385	52779	97165	48780	39984	7876.8	19.99
527	09 05 68	0100	40.5	6.6	0	5397.8	31375	39472	73546	37785	30363	0.0*	0.00
532	09 05 68	1400	58.5	6.3	0	26314.4	70172	93562	221724	113055	89664	0.0*	0.00
535	09 05 68	1800	41.5	6.5	0	6464.0	36360	48481	107869	32320	25048	8928.5	10.10
536	09 05 68	2300	45.5	6.4	0	11370.4	40934	54578	112567	56852	47756	0.0*	0.00
537	09 06 68	0300	54.5	6.5	0	9079.7	32687	49030	220183	53570	39951	0.0*	0.00
541	09 06 68	1100	76.0	7.0	0	0.0	27365	110156	175363	98760	53179	30134.6	6.33
542	09 06 68	1600	46.0	6.8	0	3065.4	50580	66573	106141	82767	65141	0.0*	0.00
543	09 06 68	2000	51.5	6.8	0	3431.9	34749	41183	109394	42899	36036	0.0*	0.00
544	09 07 68	0500	34.0	6.7	0	3398.6	19693	28888	36252	14161	12462	7335.4	7.08
545	09 07 68	0700	33.5	7.0	0	0.0	18418	19255	19255	11720	9488	0.0*	0.00
546	09 07 68	1500	51.0	6.9	0	1699.3	60980	68822	108332	56927	46731	0.0*	0.00
547	09 07 68	2100	44.5	6.8	0	2965.4	36698	46706	123438	42258	40775	0.0*	0.00
548	09 08 68	0400	32.5	6.8	0	2165.8	9746	21117	24095	10288	10288	1272.4	0.00
549	09 08 68	1000	36.5	7.0	0	0.0	9121	18243	24020	12162	10946	0.0*	0.00
550	09 08 68	1400	45.0	6.9	0	1499.4	42733	66348	132322	50980	47981	0.0*	0.00
551	09 08 68	2400	42.0	6.8	0	2798.8	31487	43033	79068	33587	31487	10040.9	8.74
552	09 09 68	0600	30.0	6.6	0	1799.2	10496	13495	14744	4499	2499	0.0*	0.00
553	09 09 68	1100	55.5	7.0	0	0.0	79056	124925	163197	77669	72121	0.0*	0.00
554	09 09 68	1430	48.5	7.2	3232	0.0	73933	94537	130898	65449	49289	16523.8	8.08
555	09 09 68	2200	47.0	6.8	0	3132.0	59901	71646	156995	68123	61859	0.0*	0.00
556	09 10 68	0100	26.0	7.0	0	0.0	15594	27939	46781	29455	28589	0.0*	0.00
557	09 10 68	0800	34.0	6.6	0	2265.7	10196	15294	25207	14727	12462	0.0*	2.83

*=NO ANALYSIS

B

TABLE A-7

S THE DATA EXTENDED TO POUNDS PER DAY
IN MILLION GALLONS PER DAY

POLITAN S.T.P. INFLUENT

OIL	PHENOL	CN	CU	ZN	NI	CD	CR	O-PO4	T-PO4	NH3-N	ORG-N	FLOW
0.0*	0.000*	14.577	62.475	262.39	58.31	26.82	124.95	11745.3	15827.6	3498.6	0.0	50.0
0.0*	0.000*	3.415	39.276	99.04	37.56	17.07	648.90	8229.1	17622.9	3347.0	956.2	41.0
0.0*	0.000*	6.997	10.845	31.48	8.74	8.74	17.74	1576.6	2623.9	979.6	979.6	21.0
0.0*	0.000*	8.221	127.240	125.28	19.57	19.57	70.47	5911.8	19575.5	3288.6	3288.6	47.0
27507.7	69.388	4.956	123.908	337.03	39.65	24.78	168.51	15017.7	30977.1	7831.0	3469.4	59.5
7876.8	19.992	6.397	43.982	95.96	23.99	19.99	135.94	9436.2	21991.3	3918.4	959.6	48.0
0.0*	0.000*	18.555	37.110	748.95	16.86	16.86	40.48	5532.7	12313.8	2833.3	1518.1	40.5
0.0*	0.000*	4.873	60.405	984.35	48.73	24.36	165.68	13234.7	20223.1	4385.7	5165.4	58.5
8928.5	10.100	28.684	58.580	165.64	105.04	20.20	149.48	6948.8	14140.1	2828.0	2828.0	48.5
0.0*	0.000*	3.790	39.796	109.91	37.90	18.95	64.43	6971.8	10991.4	3486.9	3297.4	45.5
0.0*	0.000*	4.539	43.128	154.35	22.70	22.70	63.55	4449.0	11166.0	3677.2	2224.5	54.5
30134.6	6.330	5.330	107.623	329.20	50.64	31.65	132.94	8433.2	11015.5	4621.4	5127.9	76.0
0.0*	0.000*	0.000*	0.000*	0.00*	0.00*	0.00*	0.00*	8429.9	57476.9	1532.7	2950.4	46.0
0.0*	0.000*	9.437	48.047	94.37	77.22	21.45	107.24	7807.7	12869.8	2960.0	300.3	51.5
7335.4	7.080	2.832	19.825	25.49	31.15	14.16	31.15	2209.1	3172.0	1387.7	1387.7	34.0
0.0*	0.000*	74.228	11.162	30.69	13.95	13.95	39.06	1311.5	1953.3	2344.0	1038.3	33.5
0.0*	0.000*	9.346	44.607	106.20	33.98	21.24	46.73	16568.2	21878.7	4630.6	892.1	51.0
0.0*	0.000*	14.086	41.516	77.84	37.06	18.53	40.77	9419.5	13900.6	3632.7	518.9	44.5
1272.4	0.000*	5.685	20.304	35.19	21.65	13.53	37.90	2544.8	6768.1	2463.6	595.6	32.5
0.0*	0.000*	7.601	21.283	36.48	18.24	15.20	36.48	2006.7	3162.0	2219.5	1611.4	36.5
0.0*	0.000*	3.748	34.861	56.22	37.48	18.74	33.73	9831.0	23053.2	5247.9	3373.6	45.0
10040.9	8.746	3.498	36.735	45.48	17.49	17.49	55.97	6472.4	9446.2	3673.5	2344.0	42.0
0.0*	0.000*	9.496	11.245	17.49	12.49	12.49	24.99	1124.5	1549.4	1224.5	599.7	30.0
0.0*	0.000*	26.814	102.634	171.05	27.73	23.11	106.33	11049.3	13129.7	7905.5	4484.4	55.5
16523.8	8.080	6.868	96.961	161.60	60.60	20.20	614.08	3636.1	18826.6	2949.2	3757.2	48.5
0.0*	0.000*	3.915	50.896	97.87	23.49	19.57	105.70	8143.4	13624.5	3288.6	2655.0	47.0
0.0*	0.000*	2.165	19.492	47.64	10.83	10.83	32.48	4006.7	6084.0	1754.3	1364.4	26.0
0.0*	2.832	2.832	17.559	90.63	14.16	14.16	28.32	2209.1	5607.7	1387.7	1019.6	34.0

A

TABLE A-8

THIS TAPULATION IS THE RANKED
FLOW IS IN MILLION GALLONS P

METROPOLITAN S.T.P. INFLU

PLOT	FLOW	PLOT	PH	PLOT	ALK	PLOT	ACID	PLOT	BOD5	PLOT	[illegible]	PLOT	COD	PLOT	SS	PLOT	VSS	PLOT	OIL	PLOT	PHENOL	PLOT
0.034	21.0	0.034	6.2	0.034	0	0.034	0.0	0.034	4121	0.034	13495	0.034	14744	0.034	3499	0.034	2499	0.111	1272.4	0.111	2.832	0.036
0.069	26.0	0.069	6.2	0.069	0	0.069	0.0	0.069	8746	0.069	15294	0.069	19755	0.069	9446	0.069	6297	0.222	7335.4	0.222	6.330	0.071
0.103	30.0	0.103	6.3	0.103	0	0.103	0.0	0.103	10196	0.103	17243	0.103	24020	0.103	10288	0.103	9488	0.333	7876.8	0.333	7.080	0.107
0.138	32.5	0.138	6.3	0.138	0	0.138	0.0	0.138	10436	0.138	19255	0.138	24095	0.138	11770	0.138	10288	0.444	8928.5	0.444	8.080	0.143
0.172	33.5	0.172	6.4	0.172	0	0.172	0.0	0.172	15594	0.172	21117	0.172	25207	0.172	12162	0.172	10946	0.556	10040.9	0.556	8.746	0.179
0.207	34.0	0.207	6.5	0.207	0	0.207	0.0	0.207	16368	0.207	21691	0.207	27639	0.207	14161	0.207	12462	0.667	16523.8	0.667	10.100	0.214
0.241	34.0	0.241	6.5	0.241	0	0.241	1499.4	0.241	17418	0.241	27939	0.241	36752	0.241	14727	0.241	12462	0.778	27507.7	0.778	19.992	0.250
0.276	36.5	0.276	6.5	0.276	0	0.276	1699.	0.276	18693	0.276	28888	0.276	46781	0.276	29455	0.276	25068	0.889	30134.6	0.889	69.388	0.286
0.310	40.5	0.310	6.6	0.310	0	0.310	1999.	0.310	31375	0.310	39477	0.310	73546	0.310	32320	0.310	28589	0.000	0.0*	0.000	0.000*	0.321
0.345	41.0	0.345	6.6	0.345	0	0.345	2165.8	0.345	31487	0.345	41183	0.345	79068	0.345	33587	0.345	30363	0.000	0.0*	0.000	0.000*	0.357
0.379	42.0	0.379	6.7	0.379	0	0.379	2265.7	0.379	[illegible]	0.379	43043	0.379	84699	0.379	37785	0.379	31487	0.000	0.0*	0.000	0.000*	0.393
0.414	44.5	0.414	6.8	0.414	0	0.414	2798.	0.414	34749	0.414	46107	0.414	87165	0.414	42258	0.414	33470	0.000	0.0*	0.000	0.000*	0.429
0.448	45.0	0.448	6.8	0.448	0	0.448	2965.4	0.448	36360	0.448	46706	0.448	106141	0.448	42899	0.448	36036	0.000	0.0*	0.000	0.000*	0.464
0.483	45.5	0.483	6.8	0.483	0	0.483	3065.4	0.483	36698	0.483	48451	0.483	107859	0.483	47131	0.483	37951	0.000	0.0*	0.000	0.000*	0.500
0.517	46.0	0.517	6.8	0.517	0	0.517	3132.0	0.517	38185	0.517	49030	0.517	108332	0.517	48780	0.517	39984	0.000	0.0*	0.000	0.000*	0.536
0.552	47.0	0.552	6.8	0.552	0	0.552	3132.0	0.552	38934	0.552	52779	0.552	108448	0.552	50980	0.552	40775	0.000	0.0*	0.000	0.000*	0.571
0.586	47.0	0.586	6.8	0.586	0	0.586	3398.6	0.586	39934	0.586	54578	0.586	109394	0.586	53570	0.586	46648	0.000	0.0*	0.000	0.000*	0.607
0.621	48.0	0.621	6.8	0.621	0	0.621	3431.9	0.621	40934	0.621	56377	0.621	112567	0.621	56852	0.621	46731	0.000	0.0*	0.000	0.000*	0.643
0.655	48.5	0.655	6.8	0.655	0	0.655	5247.9	0.655	42733	0.655	66348	0.655	123438	0.655	56927	0.655	47756	0.000	0.0*	0.000	0.000*	0.679
0.690	49.5	0.690	6.8	0.690	0	0.690	5397.	0.690	50580	0.690	66673	0.690	130598	0.690	61642	0.690	47981	0.000	0.0*	0.000	0.000*	0.714
0.724	50.0	0.724	6.9	0.724	0	0.724	6397.4	0.724	50980	0.724	69822	0.724	132030	0.724	65449	0.724	49289	0.000	0.0*	0.000	0.000*	0.750
0.759	51.0	0.759	6.9	0.759	0	0.759	6664.0	0.759	53529	0.759	71646	0.759	132322	0.759	68123	0.759	53179	0.000	0.0*	0.000	0.000*	0.786
0.793	51.5	0.793	7.0	0.793	0	0.793	9079.1	0.793	59901	0.793	76219	0.793	156995	0.793	73212	0.793	61859	0.000	0.0*	0.000	0.000*	0.821
0.828	54.5	0.828	7.0	0.828	0	0.828	11370.4	0.828	59976	0.828	78806	0.828	163197	0.828	77669	0.828	62642	0.000	0.0*	0.000	0.000*	0.857
0.862	55.5	0.862	7.0	0.862	0	0.862	13661.	0.862	70172	0.862	93562	0.862	175363	0.862	82767	0.862	65141	0.000	0.0*	0.000	0.000*	0.893
0.897	58.5	0.897	7.0	0.897	0	0.897	18586.	0.897	73933	0.897	94537	0.897	220183	0.897	98760	0.897	72121	0.000	0.0*	0.000	0.000*	0.929
0.931	59.5	0.931	7.0	0.931	0	0.931	21654.	0.931	79056	0.931	110156	0.931	221724	0.931	113055	0.931	89664	0.000	0.0*	0.000	0.000*	0.964
0.966	76.0	0.966	7.2	0.966	3232	0.966	26314.4	0.966	87565	0.966	124325	0.966	255252	0.966	159594	0.966	109040	0.000	0.0*	0.000	0.000*	0.000
MEAN	44.5		6.7		115		5561.4		39100		52402		103808		50315		40078		13702.5		16.568	
STD DEV	11.4		.2		611		6849.		21469		29721		65529		35295		25572		10238.1		21.910	

*=NO ANALYSIS

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TABLE A-

ULATION IS THE RANKED EXTENDED DATA
IS IN MILLION GALLONS PER DAY

METROPOLITAN S.T.P. INFLUENT

	PLOT	PHENOL	PLOT	CN	PLOT	CU	PLOT	ZN	PLOT	NI	PLOT	CD	PLOT	CR	PLOT	O-PO4	PLOT	T-PO4	PLOT	NH3-N	PLOT	ORG-N
4	0.111	2.832	0.036	2.165	0.036	10.845	0.036	17.49	0.036	8.74	0.036	8.74	0.036	15.74	0.034	1124.5	0.034	1549.3	0.034	979.6	0.034	0.0
6	0.222	6.330	0.071	2.832	0.071	11.162	0.071	25.49	0.071	10.83	0.071	10.83	0.071	24.99	0.069	1311.5	0.069	1953.3	0.069	1224.5	0.069	300.3
8	0.333	7.080	0.107	2.832	0.107	11.245	0.107	30.69	0.107	12.49	0.107	12.49	0.107	28.32	0.103	1626.8	0.103	2623.9	0.103	1387.7	0.103	518.9
5	0.444	8.080	0.143	3.415	0.143	17.559	0.143	31.48	.143	13.95	0.143	13.53	0.143	31.15	0.138	2006.7	0.138	3162.0	0.138	1387.7	0.138	595.6
9	0.556	8.746	0.179	3.498	0.179	19.492	0.179	35.19	0.179	14.16	0.179	13.95	0.179	32.48	0.172	2209.1	0.172	3172.0	0.172	1532.7	0.172	599.7
8	0.667	10.100	0.214	3.748	0.214	19.825	0.214	36.48	0.214	16.86	0.214	14.16	0.214	33.73	0.207	2209.1	0.207	5607.7	0.207	1754.3	0.207	892.1
7	0.778	19.992	0.250	3.790	0.250	20.304	0.250	45.48	0.250	17.49	0.250	14.16	0.250	36.48	0.241	2544.8	0.241	6584.0	0.241	2219.5	0.241	956.2
6	0.889	69.388	0.286	3.915	0.286	21.253	0.286	47.64	0.286	18.24	0.286	15.20	0.286	37.90	0.276	4006.7	0.276	6768.1	0.276	2344.0	0.276	959.6
0•	0.000	0.000•	0.321	4.539	0.321	34.861	0.321	56.22	0.321	19.57	0.321	16.86	0.321	39.06	0.310	4449.0	0.310	9446.2	0.310	2463.6	0.310	979.6
0•	0.000	0.000•	0.357	4.873	0.357	36.735	0.357	77.84	0.357	21.65	0.357	17.07	0.357	40.48	0.345	5532.7	0.345	10991.4	0.345	2828.0	0.345	1019.6
0•	0.000	0.000•	0.393	4.955	0.393	37.110	0.393	90.63	0.393	22.70	0.393	17.49	0.393	40.77	0.379	5911.8	0.379	11015.5	0.379	2833.8	0.379	1088.3
0•	0.000	0.000•	0.429	5.685	0.429	39.276	0.429	94.37	0.429	23.49	0.429	18.53	0.429	46.73	0.414	6472.4	0.414	11168.0	0.414	2949.2	0.414	1364.4
0•	0.000	0.000•	0.464	6.330	0.464	39.796	0.464	95.96	0.464	23.99	0.464	18.74	0.464	55.97	0.448	6948.8	0.448	12313.8	0.448	2960.0	0.448	1387.7
0•	0.000	0.000•	0.500	6.397	0.500	41.516	0.500	97.87	0.500	27.73	0.500	18.95	0.500	63.55	0.483	6973.8	0.483	12869.8	0.483	3288.6	0.483	1518.1
0•	0.000	0.000•	0.536	6.868	0.536	43.128	0.536	99.04	0.536	31.15	0.536	19.57	0.536	64.43	0.517	7807.7	0.517	13129.7	0.517	3288.6	0.517	1611.4
0•	0.000	0.000•	0.571	6.997	0.571	43.982	0.571	106.20	0.571	33.98	0.571	19.57	0.571	70.47	0.552	8143.4	0.552	13624.5	0.552	3347.0	0.552	2224.5
0•	0.000	0.000•	0.607	7.601	0.607	44.607	0.607	109.91	0.607	37.06	0.607	19.99	0.607	105.70	0.586	8299.1	0.586	13900.6	0.586	3486.9	0.586	2344.0
0•	0.000	0.000•	0.643	8.221	0.643	48.047	0.643	125.28	0.643	37.48	0.643	20.20	0.643	106.33	0.621	8429.9	0.621	14140.1	0.621	3498.6	0.621	2828.0
0•	0.000	0.000•	0.679	9.346	0.679	50.896	0.679	154.35	0.679	37.56	0.679	20.20	0.679	107.24	0.655	8483.2	0.655	15827.0	0.655	3632.7	0.655	2858.0
0•	0.000	0.000•	0.714	9.437	0.714	58.580	0.714	161.60	0.714	37.90	0.714	20.82	0.714	124.95	0.690	8686.1	0.690	17622.9	0.690	3673.5	0.690	2950.4
0•	0.000	0.000•	0.750	9.496	0.750	62.475	0.750	165.64	0.750	39.65	0.750	21.24	0.750	132.94	0.724	9436.2	0.724	18826.6	0.724	3677.2	0.724	3288.6
0•	0.000	0.000•	0.786	14.086	0.786	80.405	0.786	171.05	0.786	48.73	0.786	21.45	0.786	135.94	0.759	9489.5	0.759	19575.5	0.759	3918.4	0.759	3297.4
0•	0.000	0.000•	0.821	14.577	0.821	96.961	0.821	262.39	0.821	50.64	0.821	22.70	0.821	149.48	0.793	9821.0	0.793	20223.1	0.793	4385.7	0.793	3373.6
0•	0.000	0.000•	0.857	18.555	0.857	102.634	0.857	329.20	0.857	58.31	0.857	23.11	0.857	165.68	0.828	11049.3	0.828	21878.7	0.828	4621.4	0.828	3469.4
0•	0.000	0.000•	0.893	26.814	0.893	107.623	0.893	337.03	0.893	60.60	0.893	24.36	0.893	168.51	0.862	11745.3	0.862	21991.2	0.862	4630.6	0.862	3757.2
0•	0.000	0.000•	0.929	28.684	0.929	123.908	0.929	748.95	0.929	77.22	0.929	24.78	0.929	614.08	0.897	13254.7	0.897	23053.2	0.897	5247.9	0.897	4484.4
0•	0.000	0.000•	0.964	74.228	0.964	127.240	0.964	984.35	0.964	105.04	0.964	31.65	0.964	648.90	0.931	15017.7	0.931	30977.1	0.931	7831.0	0.931	5127.9
0•	0.000	0.000•	0.000	0.000•	0.000	0.000•	0.000	0.00•	0.000	0.00•	0.000	0.00•	0.000	0.00•	0.966	16568.3	0.966	57476.9	0.966	7905.5	0.966	5165.4
5		16.568		10.885		50.055		168.07		33.60		18.53		115.63		7127.1		14238.3		3332.1		2105.7
1		21.910		14.366		34.530		220.87		22.16		4.83		155.91		4171.2		11199.3		1689.1		1478.8

A

TABLE A-[illegible]

Onondaga County

Laboratory Treatability Data
Conventional Activated Sludge

System No. A

Date	Sample	Feed Rate, mls/min	pH	BOD	BOD$_{uc}$	COD	SS	VSS	Recycle, mls/min	O$_2$ Uptake, mg/l/hr	Temp, °F	Mixed Liquor Wasted, Liters	Remarks
[illegible]	Feed	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]					Effective aeration volume of [illegible] liters
	ML		[illegible]	---	---	---	[illegible]	[illegible]	[illegible]	[illegible]			
	Eff		---	[illegible]	[illegible]	[illegible]	[illegible]						
[illegible]	Feed	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]					Looked at ML under microscope - very active, no filament growth
	ML		[illegible]	---	---	---	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
	Eff		---	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]					
[illegible]	Feed	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]					
	ML		[illegible]	---	---	---	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
	Eff		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]					
[illegible]	Feed	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]					
	ML		[illegible]	---	---	---	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
	Eff		---	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]					
[illegible]	Feed	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]					
	ML		[illegible]	---	---	---	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
	Eff		---	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]					
[illegible]	Feed	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]					Feed stirred from this point on
	ML		[illegible]	---	---	---	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
	Eff		---	[illegible]	---	[illegible]	[illegible]	[illegible]					
[illegible]	Feed	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]					
	ML		[illegible]	---	---	---	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
	Eff		---	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]					
[illegible]	Feed	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]					
	ML		[illegible]	---	---	---	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
	Eff		---	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]					
[illegible]	Feed	[illegible]	[illegible]	[illegible]	---	[illegible]	[illegible]	[illegible]					
	ML		[illegible]	---	---	---	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
	Eff		---	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]					
[illegible]	Feed	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]					
	ML		[illegible]	---	---	---	[illegible]	[illegible]	[illegible]	[illegible]	--	[illegible]	
	Eff		---	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]					
[illegible]	Feed	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]					
	ML		[illegible]	---	---	---	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
	Eff		---	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]					
[illegible]	Feed	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]					Mixed Liquor settling test
	ML		[illegible]	---	---	---	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
	Eff		---	[illegible]	[illegible]	[illegible]	[illegible]	-					
[illegible]	Feed	[illegible]	---	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]					
	ML		[illegible]	---	---	---	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
	Eff		---	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]					
[illegible]	Feed	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]					
	ML		[illegible]	---	---	---	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
	Eff		---	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]					
[illegible]	Feed	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]					

Date	Sample	Data	Remarks
[illegible]	Feed ML Eff	[illegible]	Mixed Liquor settling test
[illegible]	Feed ML Eff	[illegible]	
[illegible]	Feed ML Eff	[illegible]	
[illegible]	Feed ML Eff	[illegible]	
[illegible]	Feed ML Eff	[illegible]	
[illegible]	Feed ML Eff	[illegible]	Oxygen Transfer Study
[illegible]	Feed ML Eff	[illegible]	
[illegible]	Feed ML Eff	[illegible]	
[illegible]	Feed ML Eff	[illegible]	
[illegible]	Feed ML Eff	[illegible]	
[illegible]	Feed ML Eff	[illegible]	
[illegible]	Feed ML Eff	[illegible]	
[illegible]	Feed ML Eff	[illegible]	KLA Test Settling Test Feed Rate Slowed
[illegible]	Feed ML Eff	[illegible]	
[illegible]	Feed ML Eff	[illegible]	Mixed Liquor Settling Test Conc. mixed liquor settling test
[illegible]	Feed ML Eff	[illegible]	
[illegible]	Feed ML Eff	[illegible]	
[illegible]	Feed ML Eff	[illegible]	
[illegible]	Feed ML Eff	[illegible]	

Mixed Liquor
Effluent

A

TABLE 4-

Onondaga County

Laboratory Treatability Data
Contact Stabilization

System No. A

Date	Sample	Feed Rate, mls/min	pH	BOD	BOD_{uc}	COD	SS	VSS	Recycle, mls/min	O2 Uptake, mg/l hr	Temp, F.	SML Wasted, liters	Remarks
[illegible]	Feed	[illegible]	---	[illegible]	---	[illegible]	[illegible]	[illegible]					Contact Volume 7.2 l
	CML		[illegible]	---	---	---	[illegible]	[illegible]		[illegible]	[illegible]		Stabilization Volume 36.4 l
	SML		[illegible]	---	---	---	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		CML Settling
	S. Sup		---	[illegible]	---	[illegible]	[illegible]	[illegible]					
	Eff.		---	[illegible]	---	[illegible]	[illegible]	[illegible]					
[illegible]	Feed	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]					
	CML		[illegible]	---	---	---	[illegible]	[illegible]		[illegible]			
	SML		[illegible]	---	---	---	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		SML Settling
	S. Sup		---	---	---	---	---	---					
	Eff		---	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]					
[illegible]	Feed	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]					Changed volume of contact tank to [illegible] l and added [illegible] l water
	CML		[illegible]	---	---	---	[illegible]	[illegible]		[illegible]			
	SML		[illegible]	---	---	---	[illegible]	[illegible]	[illegible]	[illegible]			
	S. Sup		---	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]					
	Eff		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]					
[illegible]	Feed	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]					
	CML		[illegible]	---	---	---	[illegible]	[illegible]		[illegible]			
	SML		[illegible]	---	---	---	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		SML Settling
	S. Sup		---	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]					
	Eff.		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]					
[illegible]	Feed	[illegible]	[illegible]	[illegible]	---	[illegible]	[illegible]	[illegible]					
	CML		[illegible]	---	---	---	[illegible]	[illegible]		[illegible]			
	SML		[illegible]	---	---	---	[illegible]	[illegible]	[illegible]				
	S. Sup		---	[illegible]	---	[illegible]	[illegible]	[illegible]					
	Eff		[illegible]	[illegible]	---	[illegible]	[illegible]	[illegible]					
[illegible]	Feed	[illegible]	[illegible]	[illegible]	---	[illegible]	[illegible]	[illegible]					
	CML		[illegible]	---	---	---	[illegible]	[illegible]		[illegible]			
	SML		[illegible]	---	---	---	[illegible]	[illegible]	[illegible]				
	S. Sup.		---	[illegible]	---	[illegible]	[illegible]	[illegible]					
	Eff		[illegible]	[illegible]	---	[illegible]	[illegible]	[illegible]					
[illegible]	Feed	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]					Settling Test
	CML		[illegible]	---	---	---	[illegible]	[illegible]		[illegible]			
	SML		[illegible]	---	---	---	[illegible]	[illegible]	[illegible]	[illegible]			
	S. Sup		---	[illegible]	---	[illegible]	[illegible]	[illegible]					
	Eff		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]					
[illegible]	Feed	[illegible]	---	[illegible]	---	[illegible]	[illegible]	[illegible]					
	CML		---	---	---	---	[illegible]	[illegible]		[illegible]			
	SML		---	---	---	---	[illegible]	[illegible]	[illegible]	[illegible]			
	S. Sup.		---	[illegible]	---	[illegible]	[illegible]	[illegible]					Grab Sample
	Eff		---	[illegible]	---	[illegible]	[illegible]	[illegible]					
[illegible]	Feed	[illegible]	---	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]					SML Settling
	CML		---	---	---	---	[illegible]	[illegible]	[illegible]		[illegible]		
	SML		---	---	---	---	[illegible]	[illegible]	[illegible]		[illegible]		
	S. Sup.		---	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]					
	Eff		---	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]					
[illegible]	Feed	[illegible]	---	[illegible]	---	[illegible]	[illegible]	[illegible]					
	CML		---	---	---	---	[illegible]	[illegible]		[illegible]	[illegible]		
	SML		---	---	---	---	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
	S. Sup.		---	---	---	---	[illegible]	[illegible]					
	Eff		---	[illegible]	---	[illegible]	[illegible]	[illegible]					Grab Sample
[illegible]	Feed	[illegible]	[illegible]	[illegible]	---	[illegible]	[illegible]	[illegible]					
	CML		[illegible]	---	---	---	[illegible]	[illegible]		[illegible]	[illegible]		Grab Sample
	SML		[illegible]	---	---	---	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
	S. Sup		---	[illegible]	---	[illegible]	[illegible]	---					
	Eff		[illegible]	[illegible]	---	[illegible]	[illegible]	---					
[illegible]	Feed	[illegible]	---	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]					
	CML		---	---	---	---	[illegible]	[illegible]		[illegible]			
	SML		---	---	---	---	[illegible]	[illegible]	[illegible]	[illegible]			
	S. Sup.		---	[illegible]	---	[illegible]	[illegible]	---					
	Eff.		---	[illegible]	[illegible]	[illegible]	[illegible]	---					
[illegible]	Feed	[illegible]	---	[illegible]	---	[illegible]	[illegible]	[illegible]					SML Settling
	CML		---	---	---	---	[illegible]	[illegible]		[illegible]	[illegible]		

	CML		[illegible]	---	---	---	[illegible]	[illegible]		[illegible]	[illegible]		Grab Sample
	SML		[illegible]	---	---	---	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
	S. Sup.		---	[illegible]	---	118	48	---					
	Eff.		7.5	41	---	208	54	---					
[illegible]	Feed	[illegible]	---	330	460	1160	456	276					
	CML		---	---	---	---	2296	960		[illegible]			
	SML		---	---	---	---	5090	3400	42	[illegible]			
	S. Sup.		---	26	---	118	49	---					
	Eff.		---	[illegible]	152	266	110	---					
[illegible]	Feed	[illegible]	---	308	---	640	402	140					SML Settling
	CML		---	---	---	---	5208	1256		[illegible]	[illegible]		
	SML		---	---	---	---	6892	2944	[illegible]	[illegible]	[illegible]		
	S. Sup.		---	17	---	156	4	---					
	Eff.		---	51	---	165	6	---					
[illegible]	Feed	[illegible]	---	[illegible]	---	600	456	160					
	CML		---	---	---	---	5208	1256		[illegible]	[illegible]		AM Grab Sample
	SML		---	---	---	---	6892	2944	[illegible]	[illegible]	[illegible]		
	S. Sup.		---	17	---	156	4	---					
	Eff.		---	48	---	77	4	---					
[illegible]	Feed	[illegible]	---	275	---	630	272	154					PM Grab Sample
	CML		---	---	---	---	5208	1356		[illegible]			CML Settling
	SML		---	---	---	---	6896	2944	48	[illegible]			
	S. Sup.		---	17	---	156	4*	---					
	Eff.		---	[illegible]	---	160	30	---					
[illegible]	Feed	[illegible]	7.2	458	---	1160	344	570					
	CML		7.4	---	---	---	3672	2044		[illegible]	[illegible]		
	SML		7.4	---	---	---	7724	3370	51	[illegible]	[illegible]		SML Settling Changed Stab. Tank to [illegible]
	S. Sup.		---	29	---	148	14	6					
	Eff.		7.4	77	---	342	51	[illegible]					
[illegible]	Feed	[illegible]	[illegible]	141	---	336	256	156					
	CML		7.2	---	---	---	7364	5542					
	SML		[illegible]	---	---	---	9796	4752	[illegible]	[illegible]			SML Settling Change Stab. Vol. to [illegible]
	S. Sup.		---	[illegible]	---	196	48						
	Eff.		[illegible]	[illegible]	---	[illegible]	[illegible]						
[illegible]	Feed	[illegible]	---	189	---	[illegible]	278	[illegible]					
	CML		---	---	---	---	[illegible]	[illegible]		[illegible]			
	SML		---	---	---	---	9774	[illegible]	[illegible]	[illegible]			PM Grab Sample
	S. Sup.		---	[illegible]	---	[illegible]	45	---					
	Eff.		---	[illegible]	---	[illegible]	[illegible]	---					
[illegible]	Feed	[illegible]	---	[illegible]	---	[illegible]	[illegible]	[illegible]					Grab Sample
	CML		---	---	---	---	[illegible]	[illegible]					
	SML		---	---	---	---	[illegible]	[illegible]	[illegible]				SML Settling
	S. Sup.		---	[illegible]	---	[illegible]	[illegible]	---					
	Eff.		---	[illegible]	---	[illegible]	[illegible]	---					
[illegible]	Feed	[illegible]	[illegible]	[illegible]	---	[illegible]	[illegible]	[illegible]					CML and SML Settling
	CML		[illegible]	---	---	---	[illegible]	[illegible]					
	SML		[illegible]	---	---	---	[illegible]	[illegible]	[illegible]			[illegible]	
	S. Sup.		---	[illegible]	---	[illegible]	[illegible]	---					
	Eff.		[illegible]	[illegible]	---	[illegible]	[illegible]						
[illegible]	Feed	[illegible]	[illegible]	[illegible]	---	[illegible]	[illegible]	[illegible]					
	CML		[illegible]	---	---	---	[illegible]	[illegible]					
	SML		[illegible]	---	---	---	[illegible]	[illegible]				[illegible]	
	S. Sup.		---	[illegible]	---	[illegible]	[illegible]	---					SML Settling
	Eff.		[illegible]	[illegible]	---	[illegible]	[illegible]	---					
[illegible]	Feed	[illegible]	[illegible]	[illegible]	---	[illegible]	[illegible]	[illegible]					
	CML		7.4	---	---	---	[illegible]	[illegible]		[illegible]			
	SML			---	---	---	[illegible]	[illegible]	[illegible]				
	S. Sup.		---	[illegible]	---	[illegible]	[illegible]	---				[illegible]	SML Settling
	Eff.		[illegible]	[illegible]	---	[illegible]	[illegible]	---					
[illegible]	Feed	[illegible]	[illegible]	[illegible]	---	[illegible]	[illegible]	[illegible]					
	CML		[illegible]	---	---	---	[illegible]	[illegible]					CML and SML Settling
	SML		[illegible]	---	---	---	[illegible]	[illegible]	[illegible]			[illegible]	
	S. Sup.		---	[illegible]	---	[illegible]	[illegible]	---					
	Eff.		[illegible]	[illegible]	---	[illegible]	[illegible]	---					
[illegible]	Feed	[illegible]	[illegible]	---	---	[illegible]	[illegible]	[illegible]					
	CML		[illegible]	---	---	---	[illegible]	[illegible]	[illegible]				
	SML		[illegible]	---	---	---	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	SML Settling
	S. Sup.		---	---	---	[illegible]	[illegible]	---					Grab Sample
	Eff.		[illegible]	---	---	[illegible]	[illegible]	---					

Contact Mixed Liquor
Stabilization Mixed Liquor
Settled Stabilization Supernatant

B

TABLE A-11

Laboratory Treatability Data
Conventional Activated Sludge

System No. 1B

Date	Sample	Feed Rate, mls/min	pH	BOD_5	BOD_{uc}	COD	SS	VSS	Recycle, mls/min	O_2 Uptake, mg/L/hr	Temp. °F	Remarks
9/22/68	Feed MPI[1]	51.5	7.0	186	582	824	790	658				
	No. 1 Eff. Feed	12	7.9	24	29	189	56	34				
	Mixed Liquor	--	8.0	---	---	---	274	196	51.5	20	74	
	Effluent	--	7.9	24	51	---	14	9				
9/25/68	Feed MPI	31	7.5	36	108	266	12	17				
	No. 1 Eff. Feed	12	8.0	13	17	189	28	21				
	Mixed Liquor	--	8.2	---	---	---	304	230	32	6	76	
	Effluent	--	---	7	9	158	6	[illegible]				
9/27/68	Feed MPI	45	7.9	63	14	374	170	126				
	No. 1 Eff. Feed	15	7.9	6	12	109	10	9				
	Mixed Liquor	--	7.8	---	---	---	434	296	[illegible]	12	74	
	Effluent	--	---	8	12	98	20	19				
9/28/68	Feed MPI	42	7.5	84	132	294	206	134				Floating Sludge
	No. 1 Eff. Feed	15	7.7	11	19	106	33	15				Effl. clear -
	Mixed Liquor	--	7.7	---	---	---	1064	748	31	18	70	light amber
	Effluent	--	---	13	19	79	30	15				
9/30/68	Feed MPI	45	7.7	68	83	236	164	98				
	No. 1 Eff. Feed	15	7.5	30	35	187	107	56				Effl. clear -
	Mixed Liquor	--	7.6	---	---	---	1080	752	32	22	68	some solids
	Effluent	--	---	35	57	118	33	17				Floating Sludge
10/1/68	Feed MPI	40	7.5	63	90	304	180	122				41 mixed liquor
	No. 1 Eff. Feed	15	7.5	48	58	128	56	41				wasted
	Mixed Liquor	--	7.4	---	---	---	1034	720	32	24		Dispersed solids
	Effluent	--	---	28	46	78	29	21				in effluent Floating sludge
10/3/68	Feed MPI	55	7.7	72	96	267	214	158				Wasted 21 ml mixed liquor
	No. 1 Eff. Feed	21	7.4	12	17	128	63	53				No Floating Sludge
	Mixed Liquor	--	7.5	---	---	---	1260	888	50	24	74	Clear Effluent
	Effluent	--	---	12	16	79	27	16				
10/4/68	Feed MPI	43	7.7	96	105	235	132	102				Good clear eff.
	No. 1 Eff. Feed	21.5	7.1	9	11	108	18	7				Some float. sludge
	Mixed Liquor	--	7.6	---	---	---	1112	744	40	16	66	Sludge settling
	Effluent	--	---	13	16	79	35	15				test-wasted 21
10/6/68	Feed MPI	35	7.8	27	33	49	74	38				Clear effluent
	No. 1 Eff. Feed	17	7.3	10	12	60	16	16				
	Mixed Liquor	--	7.5	---	---	---	1044	658	45	16	71	
	Effluent	--	---	5	8	10	25	14				
10/7/68	Feed MPI	65	7.5	57	65	216	96	78				41 clarifier
	No. 1 Eff. Feed	17	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				replaced with
	Mixed Liquor	--	7.5	---	---	---	[illegible]	[illegible]	[illegible]	20	70	21 clarifier
	Effluent	--	---	26	50	129	[illegible]	[illegible]				

	No. 1 Eff. Feed	17	7.3	10	12	60	16	16				
	Mixed Liquor	--	7.5	---	---	---	1044	658	45	16	71	
	Effluent	--	---	5	8	10	25	14				
10/7/68	Feed MPI	65	7.5	57	65	246	96	78				4l clarifier replaced with 2l clarifier
	No. 1 Eff. Feed	17	7.4	8	12	148	8	8				
	Mixed Liquor	--	7.5	---	---	---	948	652	38	20	70	
	Effluent	--	---	26	30	129	35	20				
10/8/68	Feed MPI	30	7.3	102	120	412	226	150				
	No. 1 Eff. Feed	24	7.3	18	25	177	40	28				
	Mixed Liquor	--	7.5	---	---	---	902	610	38	18	70	
	Effluent	--	---	18	20	177	30	17				
10/9/68	Feed MPI	45	7.5	87	---	462	260	240				Effluent slightly turbid
	No. 1 Eff. Feed	32	7.2	20	---	108	25	25				
	Mixed Liquor	--	7.8	---	---	---	1022	748	37	14	72	
	Effluent	--	---	25	---	138	57	41				
10/10/68	Feed MPI	75	7.6	111	---	424	344	286				
	No. 1 Eff. Feed	30	7.2	10	---	168	25	22				
	Mixed Liquor	--	7.4	---	---	---	1758	1264	41	30	72	
	Effluent	--	---	29	---	148	54	38				
10/14/68	Feed MPI	72	7.5	183	---	266	90	90				
	No. 1 Eff. Feed	30	7.6	7	---	156	18	---				
	Mixed Liquor	--	7.4	---	---	---	1650	1080	22	48	69	
	Effluent	--	---	18	---	148	58	---				
10/15/68	Feed MPI	72	7.2	132	---	---	184	170				Wasted 4l mixed liquor
	No. 1 Eff. Feed	26.5	7.6	23	---	138	24	---				
	Mixed Liquor	--	7.5	---	---	---	2182	1588	26.5		74	
	Effluent	--	---	59	---	187	32	---				
10/18/68	Feed MPI	64	7.3	117	162	332	120	14				
	No. 1 Eff. Feed	27	7.8	9	18	187	94	---				
	Mixed Liquor	--	7.7	---	---	---	1866	1308	40	36	76	
	Effluent	--	---	32	---	147	68	---				
10/30/68	Feed MPI	99	7.8	117	---	442	294	234				Floating Sludge and clear eff. 10l mixed liquor wasted
	No. 1 Eff. Feed	30	---	22	---	108	69	47				
	Mixed Liquor	--	7.7	---	---	---	1408	1038	38			
	Effluent	--	---	51	---	177	78	53				
10/31/68	Feed MPI	84	7.6	44	49	137	82	---				
	No. 1 Eff. Feed	28	---	17	19	108	54	50				
	Mixed Liquor	--	7.8	---	---	---	1200	872	44	21	66	
	Effluent	--	---	17	---	88	52	47				
11/1/68	Feed MPI	89	7.7	38	---	157	55	50				KLA determin.
	No. 1 Eff. Feed	30	---	27	---	118	57	40				
	Mixed Liquor	--	7.5	---	---	---	1260	904	35	22	66	
	Effluent	--	---	10	---	98	64	61				
11/2/68	Feed MPI	66	8.0	40	---	206	74	38				Floating Sludge 4l mixed liquor wasted
	No. 1 Eff. Feed	25	7.75	24	---	227	222	60				
	Mixed Liquor	--	7.75	---	---	---	988	668	33	28.5	72	
	Effluent	--	---	29	---	168	70	45				
11/3/68	Feed MPI	71	7.45	62	---	275	180	134				(Floating Sludge) 4l mixed liquor wasted
	No. 1 Eff. Feed	28	7.6	234	---	570	226	130				
	Mixed Liquor	--	7.5	---	---	---	1820	1154	58	47	70	
	Effluent	--	---	89	---	186	78	42				
11/4/68	Feed MPI	81	7.8	26	---	168	77	67				No floating sludge Settling test KLA test Thickening test
	No. 1 Eff. Feed	30	---	165	---	384	166	119				
	Mixed Liquor	--	7.5	---	---	---	2333	1464	37	43	19°C	
	Effluent	--	---	23	---	108	112	69				

[1] Metropolitan Plant Influent

B

TABLE A-[illegible]

Onondaga County

Laboratory Treatability Data
Conventional Activated Sludge

System No. 2

Date	Sample	Feed Rate, mls/min	pH	BOD_5	BOD_{uc}	COD	SS	VSS	Recycle mls/min	O_2 Uptake, mg/l/hr.	Temp, °F.	Mixed Liquor Wasted, liters	Remarks
9/16/68	Feed	61	7.2	129	165	206	37	26					
	ML[1]		7.9	---	---	---	835	602	30	24			Effective aeration volume of 20 liters
	Eff.[2]		---	8	13	39	11	10					
9/17/68	Feed	54	7.0	117	132	450	52	44					
	ML		7.75	---	---	---	944	676	32	25	74		Aggitator in clarifier
	Eff.		---	30	42	138	20	14					
9/18/68	Feed	60	6.7	138	215	308	70	52					
	ML		7.6	---	---	---	1212	940	35	26	75		
	Eff.		---	10	24	80	17	10					
9/19/68	Feed	61	7.1	108	135	206	29	27					
	ML		7.6	---	---	---	1168	812	31	29	74		
	Eff.		---	[illegible]	19	49	10	8					
[illegible]	Feed	[illegible]	[illegible]	[illegible]	[illegible]	226	[illegible]	[illegible]					

T3

[illegible]	Feed	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				
	ML		[illegible]	---	---	---	944	976	32	[illegible]	74		Aggitator in clarifier
	Eff.		---	30	42	138	20	14					
[illegible]	Feed	[illegible]	6.7	138	215	308	70	52					
	ML		7.6	---	---	---	1212	940	35	28	75		
	Eff.		---	10	24	80	17	10					
[illegible]	Feed	62	7.1	108	125	206	29	17					
	ML		7.6	---	---	---	1168	857	31	29	74		
	Eff.		---	7	19	49	10	8					
[illegible]	Feed	58	7.0	104	150	266	50	36					
	ML		7.5	---	---	---	1456	1132	30	28	73		
	Eff		---	8	10	49	12	10					
[illegible]	Feed	57	7.0	87	150	186	88	48					
	ML		7.6	---	---	---	1532	1176	31	30	76		
	Eff.		---	8	13	20	25	12					
9/22/68	Feed	60	7.0	123	141	402	50	22					
	ML		7.8	---	---	---	1986	1486	33.5	32	78		
	Eff.		7.7	6	13	146	17	9					
[illegible]	Feed	53	7.1	117	168	472	44	43					
	ML		7.7	---	---	---	2008	1500	33	36	76		
	Eff.		---	11	18	78	10	8					
9/24/68	Feed	60	7.0	105	156	442	24	---					
	ML		7.6	---	---	---	2268	1672	25	34	76		Stirring wastewater feed
	Eff.		---	11	27	167	21	12					
9/25/68	Feed	65	7.4	126	219	438	256	122					
	ML		7.6	---	---	---	2092	1460	25	40	77		
	Eff.		---	7.8	9.6	98	20	11					
9/27/68	Feed	69	7.4	105	138	412	274	136					
	ML		7.4	---	---	---	3624	2408	31	50	72		Microscope Observation - good distribution - active growth - settling test
	Eff		---	8	12	85	23	13					
9/29/68	Feed	92	7.8	102	141	344	200	116					
	ML		7.4	---	---	---	3888	2424	35	50	70		
	Eff.		---	12	14	88	40	16					
9/30/68	Feed	73	7.6	90	117	382	238	112					
	ML		7.2	---	---	---	4616	2708	35	48	68	[illegible]	
	Eff.		---	10	13	59	26	11					
10/1/68	Feed	70	7.6	120	141	412	262	120					
	ML		7.0	---	---	---	4964	2972	35	60	75	[illegible]	
	Eff.		---	16	19	98	27	23					KLA Study
10/4/68	Feed	[illegible]	7.5	111	162	394	214	122					
	ML		7.2	---	---	---	4192	2316	40	44	67	4	Settling Test
	Eff.		---	7	13	79	38	16					
10/7/68	Feed	98	7.7	117	174	256	140	72					
	ML		7.6	---	---	---	2108	1248	43	36	70	4	
	Eff.		---	4	6	69	12	4					
10/8/68	Feed	90	7.3	237	360	666	434	298					
	ML		7.4	---	---	---	3952	2520	45	66	70	6	
	Eff.		---	17	---	---	22	17					KLA Study
10/11/68	Feed	110	7.6	126	---	354	170	---					
	ML		7.6	---	---	---	3220	2034	42	40	70		
	Eff.		---	18	---	118	32	---					
10/12/68	Feed	113	7.2	129	---	451	218	174					
	ML		7.3	---	---	---	3396	2234	38	60		3	
	Eff.		---	5	---	107	6	---					
10/14/68	Feed	110	7.6	162	---	432	226	168					Settling Test
	ML		7.4	---	---	---	3644	2176	35	64	69		Conc. ML Settling Test
	Eff.		---	7	---	108	46	---					

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[1] Mixed Liquor

[2] Effluent

A

TABLE A-13

Onondaga County

Laboratory Treatability Data
Contact Stabilization

System No. 2

Date	Sample	Feed Rate, mls/min	pH	BOD$_5$	BOD$_{uc}$	COD	SS	VSS	Recycle, mls/min	O$_2$ Uptake, mg/l/hr.	Temp, °F.	SML Wasted, liters	Remarks
10/30/68	Feed	43	7.3	255	---	738	446	276					
	CML[1]		7.4	---	---	---	1486	970					
	SML[2]		7.4	---	---	---	3820	2472					Contact Volume 9.6 l
	Eff.[3]		---	29	---	108	42	40	34			2	Stabilization Volume 6.6 l
10/31/68	Feed	52	7.3	40	90	206	146	104					
	CML		7.6	---	---	---	1136	734					
	SML		7.4	---	---	---	3116	1058		18			
	Eff.		---	17	21	59	39	34	28	30	66	0.9	
11/1/68	Feed	48	7.2	108	---	343	196	154					
	CML		7.3	---	---	---	1298	874		20	66		
	SML		7.4	---	---	---	3416	2268	22	38			
	Eff.		---	19	---	168	31	28					
11/3/68	Feed	45.5	---	235	---	550	332	176					
	CML		7.4	---	---	---	3612	1746	24.5	.			
	SML		7.3	---	---	---	4488	2720			73		
	S. Sup.[4]		---	19	---	168	13	10		70			
	Eff.		---	13	---	69	21	12					
11/4/68	Feed	68	7.6	156	---	422	184	136					
	CML		7.4	---	---	---	3528	1890					
	SML		7.3	---	---	---	8408	4570		60	19°C.	1.5	
	S. Sup.		---	19	---	147	32	30	40	72			
	Eff.		---	14	---	118	37	36					
11/5/68	Feed	86	7.5	110	---	385	98	62					
	CML		7.2	---	---	---	3086	1664					
	SML		7.0	---	---	---	9488	5292		60	20.5°C.		
	S. Sup.		---	15	---	137	12	2	40	96	21.5°C.		
	Eff.		---	25	---	137	43	33					
11/7/68	Feed	76	7.4	66	96	335	168	114					
	CML		7.4	---	---	---	2467	1118					
	SML		6.8	---	---	---	15769	13109		32	20°C.		
	S. Sup.		---	23	30	178	66	39	38	51			SML Settling
	Eff.		---	38	53	168	62	42					Changed Stabilization Tank Volume from 6.6 to 12.8 l

11/5/68	Feed	86	7.5	110	---	385	98	62					
	CML		7.2	---	---	---	3066	1664		60	20.5°C.		
	SML		7.0	---	---	---	9488	5292	40	96	21.5°C.		
	S. Sup.		---	15	---	137	12	2					
	Eff.		---	25	---	137	43	33					
11/7/68	Feed	76	7.4	66	96	335	168	114					
	CML		7.4	---	---	---	2467	1118		32	20°C.		
	SML		6.8	---	---	---	15769	13109	38	51			SML Settling Changed Stabilization Tank Volume from 6.6 to 12.8 l .
	S. Sup.		---	23	30	178	66	39					
	Eff.		---	38	53	168	62	42					
11/8/68	Feed	85	7.4	77	---	246	84	58					
	CML		7.5	---	---	---	2970	1382		34	18°C.		
	SML		6.9	---	---	---	8258	4344	40	44	18°C.	1	SML Settling
	S. Sup.		---	6	---	118	50	25					
	Eff.		---	30	---	136	41	27					
11/10/68	Feed	90	7.4	66	---	284	212	134					
	CML		7.2	---	---	---	4140	1730		26	18°C.		
	SML		7.0	---	---	---	10214	5132	40	60	18°C.	1.5	SML Settling
	S. Sup.		---	18	---	118	39	22					
	Eff.		---	31	---	108	65	53					
11/11/68	Feed	99	7.3	117	---	383	110	100					
	CML		7.3	---	---	---	4414	1940		36	19°C.		
	SML		7.2	---	---	---	12420	7884	39	42	19°C.	1.5	SML Settling
	S. Sup.		---	8	---	98	39	39					
	Eff.		---	38	---	167	120	103					
11/12/68	Feed	88	7.6	45	120	374	210	136					
	CML		7.3	---	---	---	3450	1516		24	19°C.		CML and SML Settling
	SML		6.6	---	---	---	9372	4616	36	40	19°C.	4	
	S. Sup.		---	12	29	157	84	48					
	Eff.		---	32	45	128	110	80					
11/15/68	Feed	105	7.4	32	---	250	234	118					
	CML		7.2	---	---	---	2174	904		20	19°C.		
	SML		6.5	---	---	---	4646	2240	40	40	19°C.		
	S. Sup.		---	18	---	130	148	80					
	Eff.		---	20	---	140	111	63					
11/16/68	Feed	82	7.1	98	---	420	330	176					
	CML		7.4	---	---	---	3311	1478		29	62		
	SML		7.2	---	---	---	9360	4484	40	43	62	5	Stabilization Tank Volume Reduced to 6.6 l from 12.8 l
	S. Sup		---	24	---	140	170	78					
	Eff.		---	28	---	110	67	45					
11/18/68	Feed	89	7.2	66	76	180	162	103					
	CML		7.6	---	---	---	2114	1022		24	15°C.		
	SML		7.5	---	---	---	5600	2746	38	40	15°C.	1	SML Settling Test
	S. Sup.		---	22	31	98	83	46					
	Eff.		---	40	50	150	82	54					
11/20/68	Feed	90	7.3	78	---	284	270	176					
	CML		7.3	---	---	---	1936	972		22	15°C.		
	SML		7.0	---	---	---	4518	2347	37	32	15°C.	1	SML Settling Test
	S. Sup.		---	---	---	---	34	15					
	Eff.		---	45	---	78	39	25					

[1] Contact Mixed Liquor.
[2] Stabilization Mixed Liquor.
[3] Effluent.
[4] Settled Supernatant.

TABLE A-1
(continued)

Onondaga County

Laboratory Treatability Data
Contact Stabilization

System No. 2

Date	Sample	Feed Rate, mls/min	pH	BOD_5	BOD_{uc}	COD	SS	VSS	Recycle, mls/min	O_2 Uptake, mg/l/hr.	Temp, °F.	SML Wasted, liters	Remarks
11/21/68	Feed	100	7.1	128	---	227	166	108					
	CML[1]		7.3	---	---	---	2054	983					
	SML[2]		7.2	---	---	---	5422	2972		30	17°C.		
	S. Sup.[4]		---	20	---	78	30	25	26	44	17°C.	1	SML Settling Test
	Eff.[3]		---	27	---	140	29	24					
11/22/68	Feed	110	7.4	108	---	337	284	206					
	CML		7.6	---	---	---	2439	1270					
	SML		7.6	---	---	---	6270	3484		40	18°C.		
	S. Sup.		---	17	---	116	52	43	39	42	18°C.	1	SML Settling Test
	Eff.		---	27	---	173	161	139					
[illegible]	Feed	108	8.1	60	---	157	108	---					
	CML		7.7	---	---	---	2382	1228					
	SML		7.5	---	---	---	7324	3816		16.5	66		
	S. Sup.		---	20	---	107	44	---	35	26	66		
	Eff.		7.7	34	---	118	42	---					
[illegible]	Feed	97	7.6	98	---	275	184	118					
	CML		7.7	---	---	---	2154	1092					
	SML		7.6	---	---	---	7668	4004		33	63		
	S. Sup.		---	14	---	58	38	---	30	44	62	4	
	Eff.		7.6	53	---	108	53	---					
[illegible]	Feed	95	7.4	103	---	213	28	---					
	CML		7.7	---	---	---	2132	1078					
	SML		---	---	---	---	5866	3074		28	60		CML Settling Test
	S. Sup.		---	14	---	78	32	---	43	33	58	3	SML Settling Test
	Eff.		7.6	[illegible]	---	[illegible]	[illegible]	---					Reduced Contact Tank

	S. Sup.		---	20	---	127	44	---					
	Eff.		7.7	34	---	118	42	---					
11/24/68	Feed	97	7.6	96	---	275	184	112					
	CML		7.7	---	---	---	2154	1092		33	63		
	SML		7.5	---	---	---	7668	4004	30	44	62	4	
	S. Sup.		---	14	---	56	38	---					
	Eff.		7.6	53	---	108	53	---					
11/25/68	Feed	95	7.4	103	---	213	28	---					
	CML		7.7	---	---	---	2132	1078		28	60		CML Settling Test
	SML		---	---	---	---	5866	3074	43	33	58	3	SML Settling Test
	S. Sup.		---	14	---	78	32	---					Reduced Contact Tank
	Eff.		7.6	40	---	87	14	---					to 4 1
11/26/68	Feed	96	7.6	83	---	266	142	70					
	CML		8.0	---	---	---	2491	1134		42	59		
	SML		7.5	---	---	---	5298	2840	45	35	59	3	SML Settling Test
	S. Sup.		---	12	---	58	31	9					
	Eff.		7.7	45	---	98	51	31					
11/27/68	Feed	81	7.4	135	---	362	252	134					
	CML		7.8	---	---	---	2600	1260		39	64		
	SML		7.4	---	---	---	5360	2890	41	42	65		
	S. Sup.		---	13	---	68	19	4					
	Eff.		7.8	47	---	98	37	20					
11/28/68	Feed	78	---	72	---	246	196	194					
	CML		7.6	---	---	---	2610	1354		30	17°C.		
	SML		7.0	---	---	---	4730	2564	44	34	17°C.	3.5	SML Settling Test
	S. Sup.		---	9	---	68	38	34					
	Eff.		---	36	---	108	96	80					
11/29/68	Feed	75	7.3	168	---	443	278	156					
	CML		7.7	---	---	---	2934	1396		39			
	SML		7.2	---	---	---	5786	2934	41	51		3	SML Settling Test
	S. Sup.		---	10	---	88	23	---					
	Eff.		7.4	67	---	158	24	---					
12/2/68	Feed	71	7.9	40	---	168	184	---					
	CML		7.9	---	---	---	2108	916		19	64		
	SML		7.5	---	---	---	4080	1968	35	24	64	2	SML Settling Test
	S. Sup.		---	11	---	88	90	---					
	Eff.		7.6	19	---	88	27	---					
12/3/68	Feed	68	7.4	82	---	303	200	148					
	CML		7.7	---	---	---	2380	1012		38	64		
	SML		7.4	---	---	---	3962	1836	39	30	64	3.3	SML Settling Test
	S. Sup.		---	15	---	98	90	---					
	Eff.		7.7	34	---	108	56	---					
12/4/68	Feed	75	---	56	---	256	206	154					
	CML		8.0	---	---	---	2270	932		43			CML and SML Settling Test
	SML		7.4	---	---	---	3706	1818	39	30		1.3	
	S. Sup.		---	19	---	98	66	---					
	Eff.		---	25	---	118	32	---					
12/5/68	Feed	80	7.2	60	---	303	206	142					
	CML		7.6	---	---	---	2524	994		42			
	SML		7.2	---	---	---	4658	2134	45	33		1.3	SML Settling Test
	S. Sup.		---	10	---	88	40	---					
	Eff.		7.5	22	---	118	36	---					
12/6/68	Feed	84	7.1	40	---	196	194	---					
	CML		7.5	---	---	---	2784	1154		30			
	SML		7.3	---	---	---	5030	2446	64	27		2	SML Settling Test
	S. Sup.		---	8	---	68	144	---					
	Eff.		7.35	13	---	49	132	---					
12/7/68	Feed	76	7.4	50	---	226	224	---					
	CML		7.5	---	---	---	2796	1226		36			
	SML		7.4	---	---	---	4452	2200	65	60			
	Eff.		---	9	---	78	92	---					

[1] Contact Mixed Liquor
[2] Stabilization Mixed Liquor
[3] Effluent
[4] Settled Stabilization Supernatant

B

TABLE A-[illegible]

Onondaga County

Laboratory Treatability Data
Plain Aeration System

System No. A

Date	Sample	Feed Rate, mls/min	pH	BOD$_5$	BOD$_{uc}$	COD	SS	VSS	Temp. F.	O$_2$ Uptake, mg/l/hr	Remarks
[illegible]	Feed	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]			
	ML		[illegible]	---	---	---	---	---	[illegible]		Aeration Volume = [illegible] 1
	Eff.		---	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]			
[illegible]	Feed	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]			
	ML		[illegible]	---	---	---	---	---	[illegible]		
	Eff.		---	---	---	[illegible]	[illegible]	[illegible]			
[illegible]	Feed	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]			
	ML		[illegible]	---	---	---	[illegible]	[illegible]	[illegible]		Turbid Effluent
	Eff.		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]			
[illegible]	Feed	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]			
	ML		[illegible]	---	---	---	---	---	[illegible]		Turbid Effluent
	Eff.		---	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]			
[illegible]	Feed	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]			
	ML		[illegible]	---	---	---	---	---	[illegible]		
	Eff.		---	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]			
[illegible]	Feed	[illegible]	---	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]			
	ML		---	---	---	---	---	---	[illegible]		Aeration Volume increased to [illegible] 1 today
	Eff.		---	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]			
[illegible]	Feed	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]			Changed back to [illegible] 1 aeration volume
	ML		[illegible]	---	---	---	---	---	[illegible]		
	Eff.		---	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]			
[illegible]	Feed	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]			
	ML		[illegible]	---	---	---	---	---	[illegible]		
	Eff.		---	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]			
[illegible]	Feed	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]			
	ML		[illegible]	---	---	---	---	---	[illegible]		
	Eff.		---	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]			
[illegible]	Feed	[illegible]	---	[illegible]	---	[illegible]	[illegible]	[illegible]			
	ML		[illegible]	---	---	---	---	---	[illegible]		
	Eff.		---	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]			
[illegible]	Feed	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]			
	ML		[illegible]	---	---	--	---	---		[illegible]	
	Eff.		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]			
[illegible]	Feed	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]			
	ML		[illegible]	---	---	---	---	---			
	Eff		---	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]			
[illegible]	Feed	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]			
	ML		[illegible]	---	---	---	---	---			
	Eff		---	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]			
[illegible]	Feed	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]			
	ML		[illegible]	---	---	---	---	---			
	Eff		---	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]			
[illegible]	Feed	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]			
	ML		[illegible]	---	---	---	[illegible]	[illegible]	67		
	Eff.		---	---	---	[illegible]	[illegible]	[illegible]			
[illegible]	Feed	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]			Feed rate slowed down
	ML		[illegible]	---	---	---	---	---	[illegible]		
	Eff.		---	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]			
[illegible]	Feed	[illegible]	[illegible]	[illegible]	---	[illegible]	[illegible]	[illegible]			Feed rate slowed down

[illegible]	Feed	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]			
	ML		7.6	---	---	---	---	---			
	Eff		---	[illegible]	[illegible]	[illegible]	[illegible]	56			
[illegible]	Feed	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]			
	ML		[illegible]	---	---	---	[illegible]	[illegible]	[illegible]		
	Eff.		---	---	---	[illegible]	[illegible]	56			
[illegible]	Feed	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]			Feed rate slowed down
	ML		[illegible]	---	---	---	---	---	[illegible]		
	Eff		---	[illegible]	[illegible]	[illegible]	[illegible]	56			
[illegible]	Feed	[illegible]	[illegible]	[illegible]	---	[illegible]	[illegible]	[illegible]			Feed rate slowed down
	ML		[illegible]	---	---	---	---	---	[illegible]		
	Eff		---	[illegible]	---	[illegible]	[illegible]	[illegible]			
[illegible]	Feed	[illegible]	[illegible]	[illegible]	---	[illegible]	[illegible]	[illegible]			
	ML		[illegible]	---	---	---	---	---	[illegible]		
	Eff		---	[illegible]	---	[illegible]	[illegible]	---			
[illegible]	Feed	[illegible]	[illegible]	[illegible]	---	[illegible]	[illegible]	[illegible]			
	ML		[illegible]	---	---	---	[illegible]	[illegible]	[illegible]	[illegible]	
	Eff		---	[illegible]	---	[illegible]	[illegible]	---			
[illegible]	Feed	[illegible]	[illegible]	[illegible]	---	[illegible]	[illegible]	[illegible]			
	ML		[illegible]	---	---	---	---	---	[illegible]		
	Eff		---	[illegible]	---	[illegible]	[illegible]	---			
[illegible]	Feed	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]			
	ML		[illegible]	---	---	---	---	---			
	Eff		---	[illegible]	[illegible]	[illegible]	[illegible]	---			
[illegible]	Feed	[illegible]	[illegible]	[illegible]	---	[illegible]	[illegible]	[illegible]			
	ML		[illegible]	---	---	---	[illegible]	[illegible]			
	Eff.		---	[illegible]	---	[illegible]	[illegible]	---			
[illegible]	Feed	[illegible]	[illegible]	[illegible]	---	[illegible]	[illegible]	[illegible]			
	ML		[illegible]	---	---	---	---	---			
	Eff		---	[illegible]	---	[illegible]	[illegible]	[illegible]			
[illegible]	Feed	[illegible]	[illegible]	[illegible]	---	[illegible]	[illegible]	[illegible]			
	ML		[illegible]	---	---	---	---	---			
	Eff		---	[illegible]	---	[illegible]	[illegible]	---			
[illegible]	Feed	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	---	---			
	ML		[illegible]	---	---	---	[illegible]	[illegible]	[illegible]	[illegible]	
	Eff		---	[illegible]	[illegible]	[illegible]	---	---			
[illegible]	Feed	[illegible]	[illegible]	---	---	[illegible]	---	---			
	ML		[illegible]	---	---	---	[illegible]	[illegible]	[illegible]	[illegible]	
	Eff.		---	---	---	[illegible]	---	---			
[illegible]	Feed	[illegible]	[illegible]	[illegible]	---	[illegible]	[illegible]	[illegible]			
	ML		[illegible]	---	---	---	---	---	[illegible]		
	Eff.		---	[illegible]	---	[illegible]	[illegible]	---			
[illegible]	Feed	[illegible]	[illegible]	[illegible]	---	[illegible]	[illegible]	[illegible]			
	ML		[illegible]	---	---	---	[illegible]	[illegible]			
	Eff		---	[illegible]	---	[illegible]	[illegible]	[illegible]			
[illegible]	Feed	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]			
	ML		[illegible]	---	---	---	[illegible]	[illegible]			
	Eff		---	[illegible]	---	[illegible]	[illegible]	[illegible]			
[illegible]	Feed	[illegible]	[illegible]	[illegible]	---	[illegible]	[illegible]	[illegible]			
	ML		[illegible]	---	---	---	[illegible]	[illegible]	[illegible]	[illegible]	
	Eff		---	[illegible]	---	[illegible]	[illegible]	[illegible]			
[illegible]	Feed	[illegible]	[illegible]	---	---	[illegible]	[illegible]	[illegible]			
	ML		[illegible]	---	---	---	---	---			
	Eff		---	[illegible]	---	[illegible]	[illegible]	[illegible]			
[illegible]	Feed	[illegible]	[illegible]	[illegible]	---	[illegible]	[illegible]	[illegible]			Aeration volume changed to [illegible] l
	ML		[illegible]	---	---	---	---	---	[illegible]		
	Eff.		---	[illegible]	---	[illegible]	[illegible]	[illegible]			
[illegible]	Feed	[illegible]	[illegible]	[illegible]	---	[illegible]	[illegible]	[illegible]			
	ML		[illegible]	---	---	---	---	---	[illegible]		
	Eff.		---	[illegible]	---	[illegible]	[illegible]	---			

Mixed Liquor
Effluent after settling

13

A

TABLE A-[illegible]

Onondaga County

Laboratory Treatability Data
Conventional Activated System

System No. [illegible]

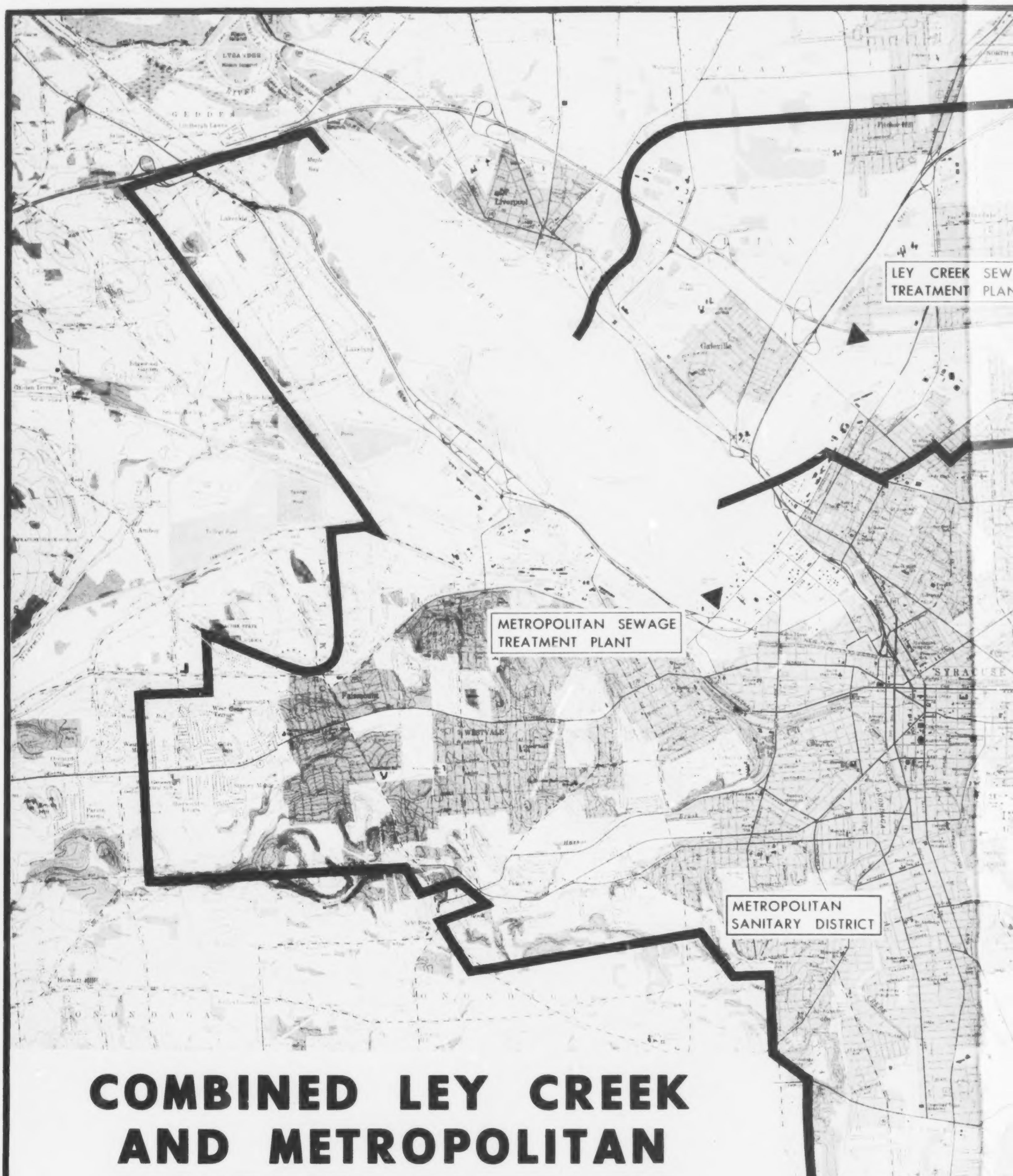
Date	Sample	Feed Rate, mls/min	pH	BOD_5	BOD_{WS}	COD	SS	VSS	Recycle, mls/min	O_2 Uptake, mg/l/hr	Temp, °F	Mixed Liquor Wasted, liters	Remarks
[illegible]	Feed-MPI	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]					Effective Aeration Volume = [illegible]
	Feed-No. [illegible] Eff.		---	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]					
	ML		[illegible]	---	---	---	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
	Eff. [illegible]		---	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]					
[illegible]	Feed-MPI	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]					
	Feed-No. [illegible] Eff.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]					
	ML		[illegible]	---	---	---	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
	Eff.			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]					
[illegible]	Feed-MPI	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]					
	Feed-No. [illegible] Eff.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]					
	ML			---	---	---	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
	Eff.		---	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]					
[illegible]	Feed-MPI	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]					Settling Test
	Feed-No. [illegible] Eff.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]					
	ML		[illegible]	---	---	---	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
	Eff.		---	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]					
[illegible]	Feed-MPI	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]					
	Feed-No. [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]						
	ML		[illegible]	---	---	---	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
	Eff.		---	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]					
[illegible]	Feed-MPI	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]					
	Feed-No. [illegible] Eff.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]					
	ML		[illegible]	---	---	---	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
	Eff.		---	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]					
[illegible]	Feed-MPI	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]					Floating Sludge in Clarifier
	Feed-No. [illegible] Eff.	[illegible]	---	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]					
	ML		[illegible]	---	---	---	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
	Eff.		---	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]					
[illegible]	Feed-MPI	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]					Floating Sludge in Clarifier
	Feed-No. [illegible] Eff.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]					
	ML		[illegible]	---	---	---	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
	Eff.		---	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]					
[illegible]	Feed-MPI	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]					Settling Test
	Feed-No. [illegible] Eff.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]					
	ML		[illegible]	---	---	---	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
	Eff.		---	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]					
[illegible]	Feed-MPI	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]					MPI Feed Slowed Down
	Feed-No. [illegible] Eff.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]					
	ML		[illegible]	---	---	---	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
	Eff.		---	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]					
[illegible]	Feed-MPI	[illegible]	[illegible]	[illegible]	---	[illegible]	[illegible]	[illegible]					
	Feed-No. [illegible] Eff.	[illegible]	[illegible]	[illegible]	---	[illegible]	[illegible]	[illegible]					
	ML		[illegible]	---	---	---	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
	Eff.		---	[illegible]	---	[illegible]	[illegible]	[illegible]					
[illegible]	Feed-MPI	[illegible]	[illegible]	[illegible]	---	[illegible]	[illegible]	---					
	Feed-No. [illegible] Eff.												

	Eff.		---	15	14	108	20	9					
10/9/68	Feed-MPI	13	7.3	27	33	49	74	58					MPI Feed Slowed Down
	Feed-No. 3 Eff.	15	8.1	81	105	256	142	48					
	ML		7.7	---	---	---	968	672	10	18	71		
	Eff.		---	7	10	10	8	8					
10/10/68	Feed-MPI	60	7.4	128	---	275	170	144					
	Feed-No. 3 Eff.	15	7.8	159	---	454	158	116					
	ML		7.4	---	---	---	1894	1354	44	52	72		
	Eff.		---	11	---	78	35	28					
10/11/68	Feed-MPI	48	7.4	90	---	207	196	---					
	Feed-No. 3 Eff.	[illegible]	7.7	222	---	610	224	---					
	ML		[illegible]	---	---	---	2506	1794	37	41	71		
	Eff.		---	21	---	148	44	---					
10/14/68	Feed-MPI	15	7.5	184	---	266	90	92					
	Feed-No. 3 Eff.	52	7.6	186	---	491	352	---					
	ML		7.2	---	---	---	2360	1542	55	44	69		
	Eff.		---	---	---	128	66	---					
10/15/68	Feed-MPI	32	7.3	111	---	354	182	180					
	Feed-No. 3 Eff.	21	7.8	192	---	560	130	---					
	ML		7.8	---	---	---	2666	1964	58		73	[illegible]	
	Eff.		---	65	---	203	88	---					
10/16/68	Feed-MPI	65	7.4	226	---	630	376	300					
	Feed-No. 3 Eff.	19	7.8	191	---	502	108	---					
	ML		7.5	---	---	---	3226	2430	48				
	Eff.		---	13	---	108	10	---					
[illegible]	Feed-MPI	75	7.3	300	468	728	500	330					
	Feed-No. 3 Eff.	36	7.8	168	240	495	138	---					
	ML		7.4	---	---	---	4152	2958	33	51	37	[illegible]	Settling Test
	Eff.		---	27	32	118	12	---					
[illegible]	Feed-MPI	76	7.4	131	---	166	116	160					
	Feed-No. 3 Eff.	20.5	---	263	---	629	150	---					
	ML		7.6	---	---	---	3088	2690	40	50			
	Eff.		---	15	---	90	44	---					
[illegible]	Feed-MPI	86	7.7	75	---	96	68	---					
	Feed-No. 3 Eff.	20	---	96	---	316	118	---					
	ML		7.7	---	---	---	2990	2644	46			[illegible]	
	Eff.		---	9	---	40	38	---					
[illegible]	Feed-MPI	91	7.5	59	---	394	114	---					
	Feed-No. 3 Eff.	25	7.9	96	---	353	92	---					
	ML		7.4	---	---	---	2600	1836	43	60		[illegible]	
	Eff.		---	8	---	98	48	---					
[illegible]	Feed-MPI	89	7.5	68	---	300	200	284					Settling Test
	Feed-No. 3 Eff.	16	7.7	651	---	1195	230	---					4 l Clarifier underflow wasted
	ML		7.6	---	---	---	2816	2056	53	51		[illegible]	KLA Test
	Eff.		---	7	---	90	18	---					
[illegible]	Feed-MPI	97	7.4	85	145	384	---	---					Metals Analyses on ML
	Feed-No. 3 Eff.	82	---	258	304	548	---	---					
	ML		7.4	---	---	---	2486	1952	39	48	71	[illegible]	
	Eff.		---	19	24	98	16	---					
[illegible]	Feed-MPI	96	7.8	20	---	118	208	36					
	Feed-No. 3 Eff.	30	---	111	---	382	228	32					
	ML		7.4	---	---	---	2366	1683	44		52	[illegible]	
	Eff.		---	8	---	118	35	7					
[illegible]	Feed-MPI	84	7.6	---	---	167	---	---					
	Feed-No. 3 Eff.	33	---	---	---	265	---	---					
	ML		7.7	---	---	---	2024	1368					
	Eff.		---	---	---	59	---	---					
10/29/68	Feed-MPI	94	7.9	65	---	265	104	---					KLA Test
	Feed-No. 3 Eff.	52	---	132	---	314	126	---					
	ML		7.5	---	---	---	2212	1508	40	58	67	[illegible]	
	Eff.		---	26	---	79	45	---					

[1] Feed-Metropolitan Plant Influent
[2] Feed-No. 3 System Clarified Effluent
[3] Mixed Liquor
[4] Effluent

B

A

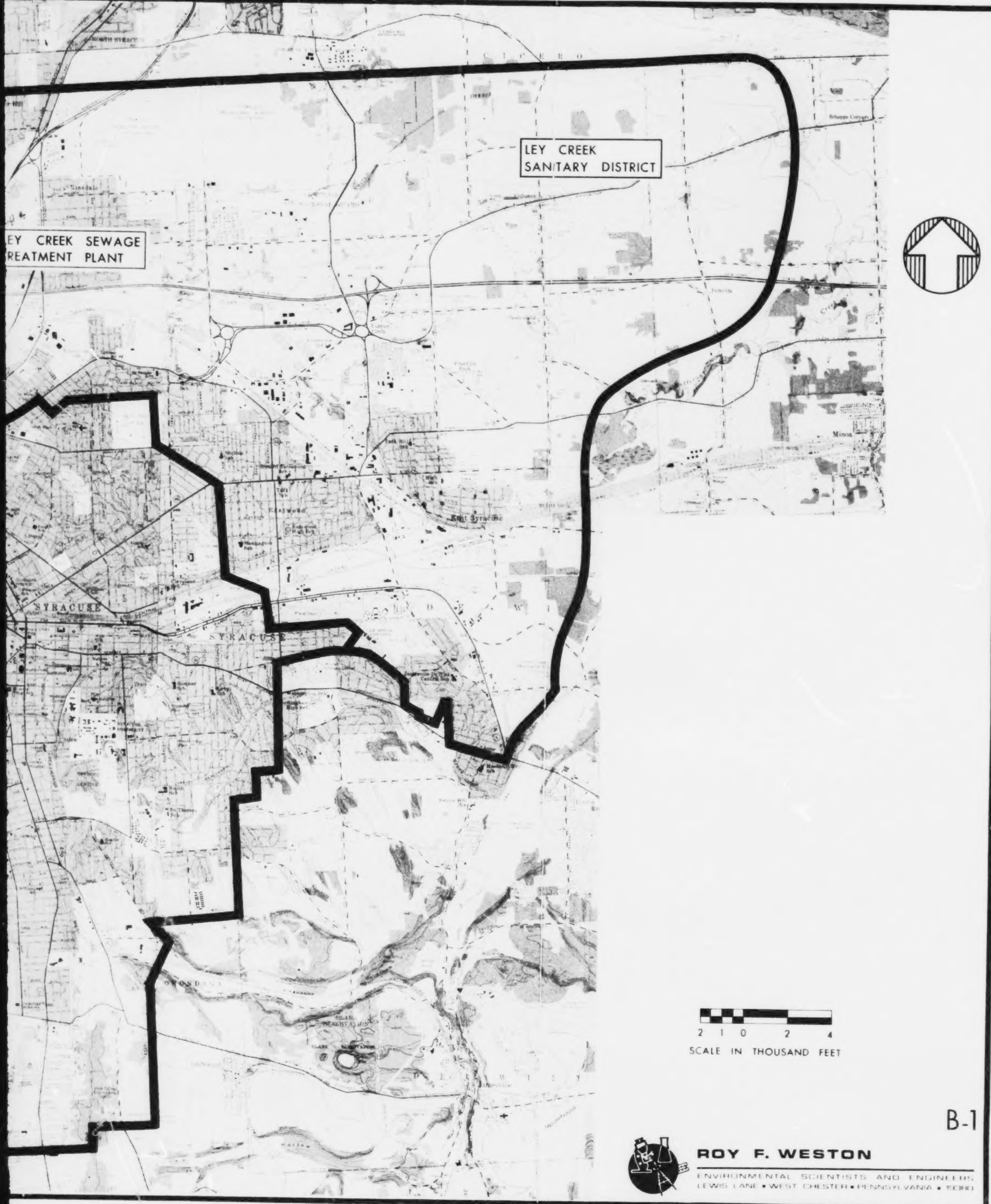


LEY CREEK SEW
TREATMENT PLAN
METROPOLITAN SEWAGE
TREATMENT PLANT
METROPOLITAN
SANITARY DISTRICT
Liverpool
Galeville
Westvale
Syracuse

COMBINED LEY CREEK AND METROPOLITAN SANITARY DISTRICTS

SYRACUSE, NEW YORK

W.O.33605

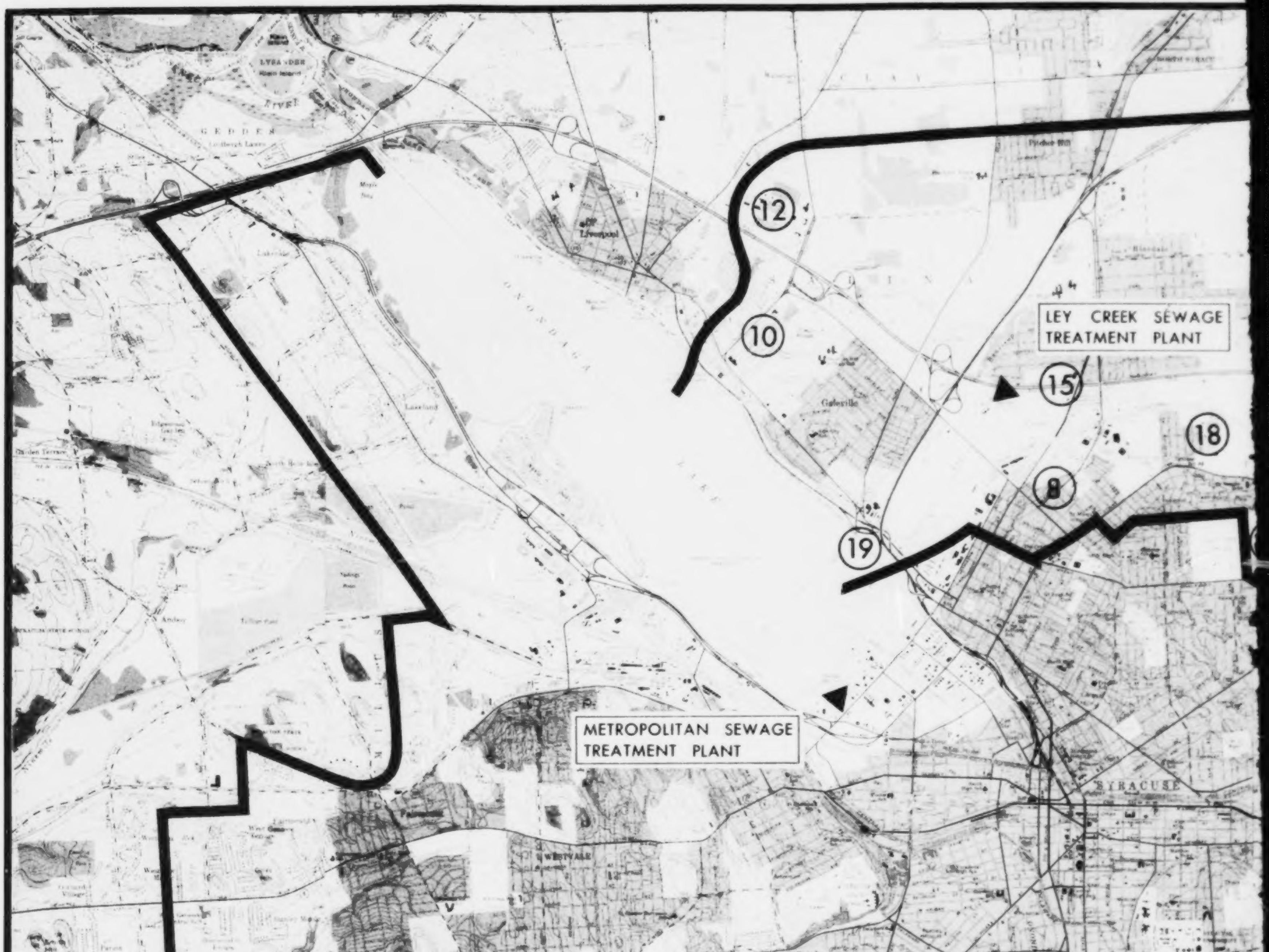

LEY CREEK
SANITARY DISTRICT
EY CREEK SEWAGE
REATMENT PLANT
CICERO
SYRACUSE
SYRACUSE
East Syracuse
Minoa
2 1 0 2 4
SCALE IN THOUSAND FEET

B-1

ROY F. WESTON

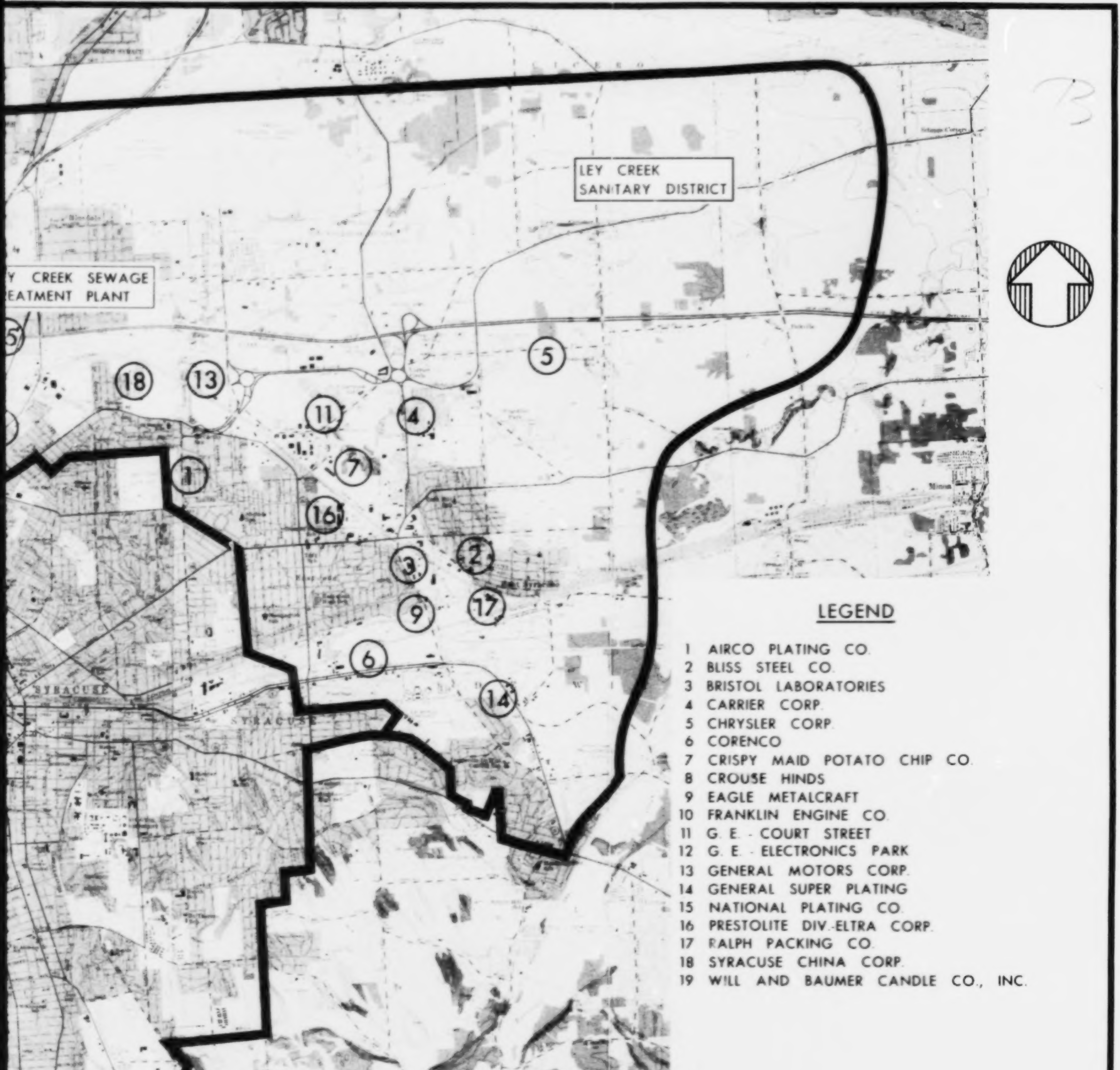
ENVIRONMENTAL SCIENTISTS AND ENGINEERS
LEWIS LANE • WEST CHESTER • PENNSYLVANIA • 19380

A


LYSANDER
GEDDES
CLAY
ONONDAGA LAKE
Liverpool
Galeville
12
10
LEY CREEK SEWAGE TREATMENT PLANT
15
18
8
19
METROPOLITAN SEWAGE TREATMENT PLANT
SYRACUSE
WESTVALE
METROPOLITAN SANITARY DISTRICT
ONONDAGA

LOCATION OF INDUSTRIES SAMPLED

W.O.33605


LEY CREEK
SANITARY DISTRICT
Y CREEK SEWAGE
REATMENT PLANT
SYRACUSE
LEGEND
1 AIRCO PLATING CO.
2 BLISS STEEL CO.
3 BRISTOL LABORATORIES
4 CARRIER CORP.
5 CHRYSLER CORP.
6 CORENCO
7 CRISPY MAID POTATO CHIP CO.
8 CROUSE HINDS
9 EAGLE METALCRAFT
10 FRANKLIN ENGINE CO.
11 G. E. - COURT STREET
12 G. E. - ELECTRONICS PARK
13 GENERAL MOTORS CORP.
14 GENERAL SUPER PLATING
15 NATIONAL PLATING CO.
16 PRESTOLITE DIV.-ELTRA CORP.
17 RALPH PACKING CO.
18 SYRACUSE CHINA CORP.
19 WILL AND BAUMER CANDLE CO., INC.
2 1 0 2 4
SCALE IN THOUSAND FEET
ROY F. WESTON
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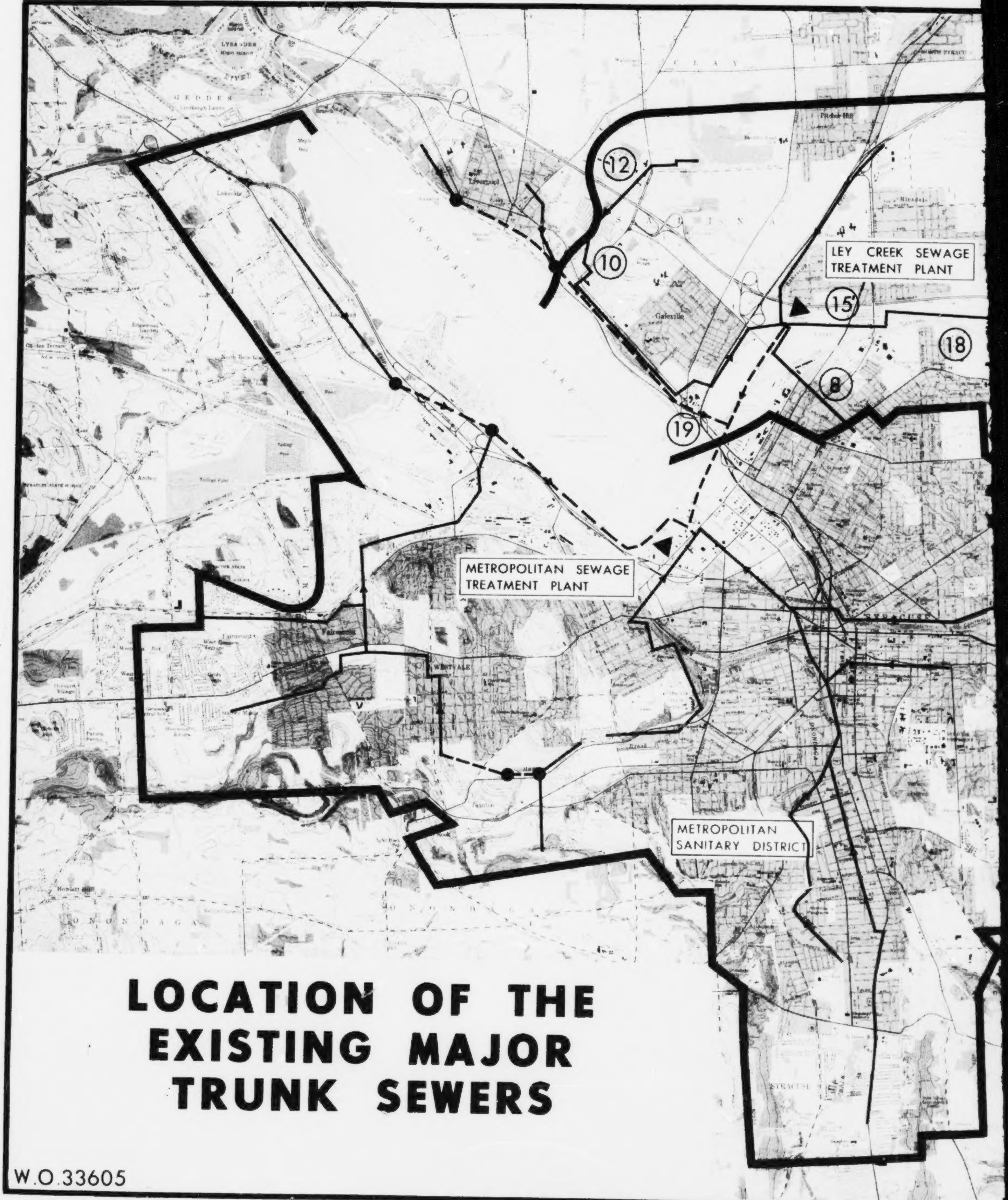
B-2

A


LYSANDER
GEDDES
CLAY
Liverpool
ONONDAGA LAKE
Galeville
12
10
LEY CREEK SEWAGE TREATMENT PLANT
15
18
8
19
METROPOLITAN SEWAGE TREATMENT PLANT
WESTVALE
METROPOLITAN SANITARY DISTRICT
SYRACUSE
ONONDAGA

LOCATION OF THE EXISTING MAJOR TRUNK SEWERS

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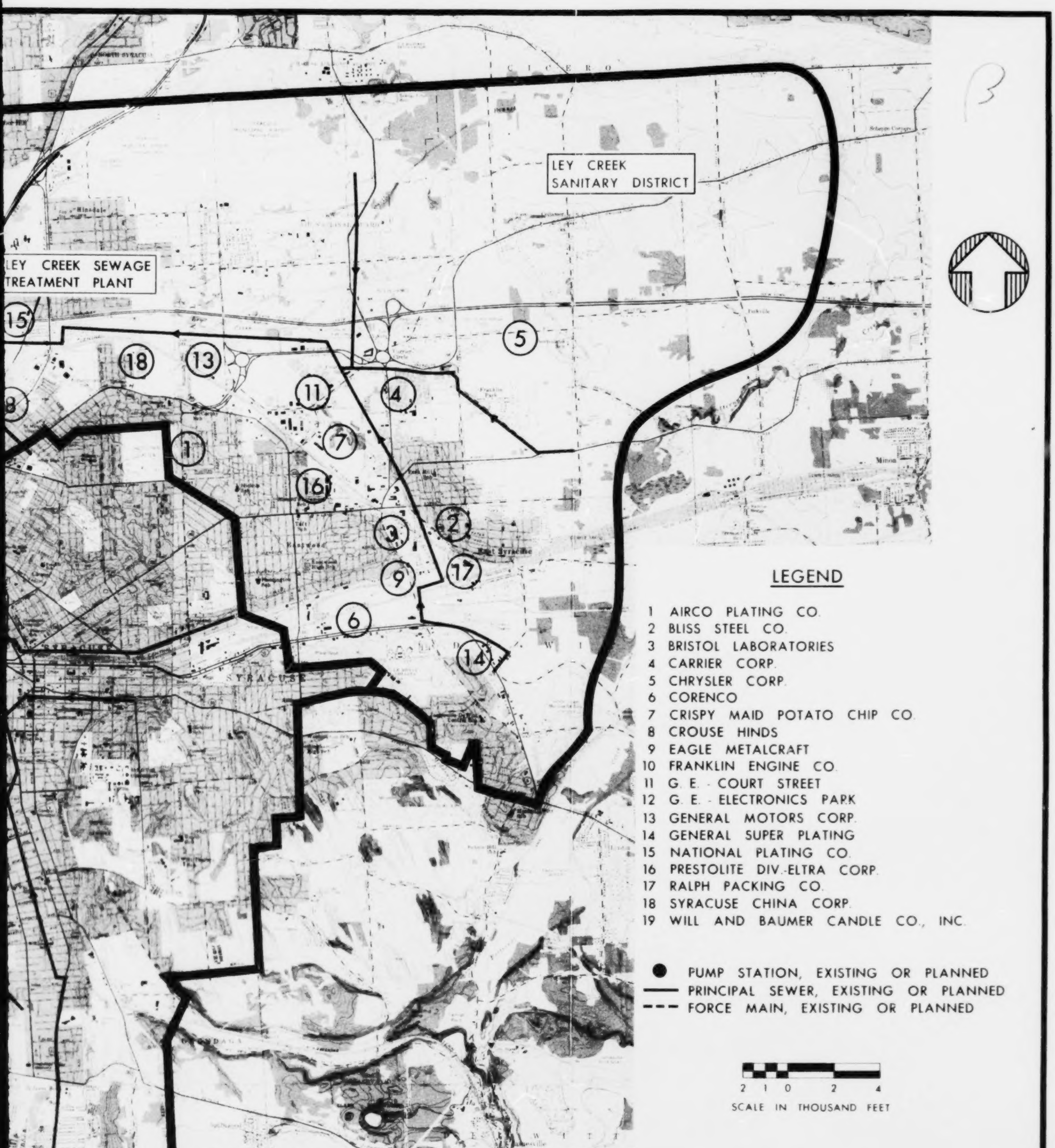
B


LEY CREEK
SANITARY DISTRICT
LEY CREEK SEWAGE
TREATMENT PLANT
CICERO
SYRACUSE
ONONDAGA
1
2
3
4
5
6
7
8
9
11
13
14
15
16
17
18
2 1 0 2 4
SCALE IN THOUSAND FEET

LEGEND

1 AIRCO PLATING CO.
2 BLISS STEEL CO.
3 BRISTOL LABORATORIES
4 CARRIER CORP.
5 CHRYSLER CORP.
6 CORENCO
7 CRISPY MAID POTATO CHIP CO.
8 CROUSE HINDS
9 EAGLE METALCRAFT
10 FRANKLIN ENGINE CO.
11 G. E. - COURT STREET
12 G. E. - ELECTRONICS PARK
13 GENERAL MOTORS CORP.
14 GENERAL SUPER PLATING
15 NATIONAL PLATING CO.
16 PRESTOLITE DIV.-ELTRA CORP.
17 RALPH PACKING CO.
18 SYRACUSE CHINA CORP.
19 WILL AND BAUMER CANDLE CO., INC.

● PUMP STATION, EXISTING OR PLANNED
— PRINCIPAL SEWER, EXISTING OR PLANNED
--- FORCE MAIN, EXISTING OR PLANNED

B-3

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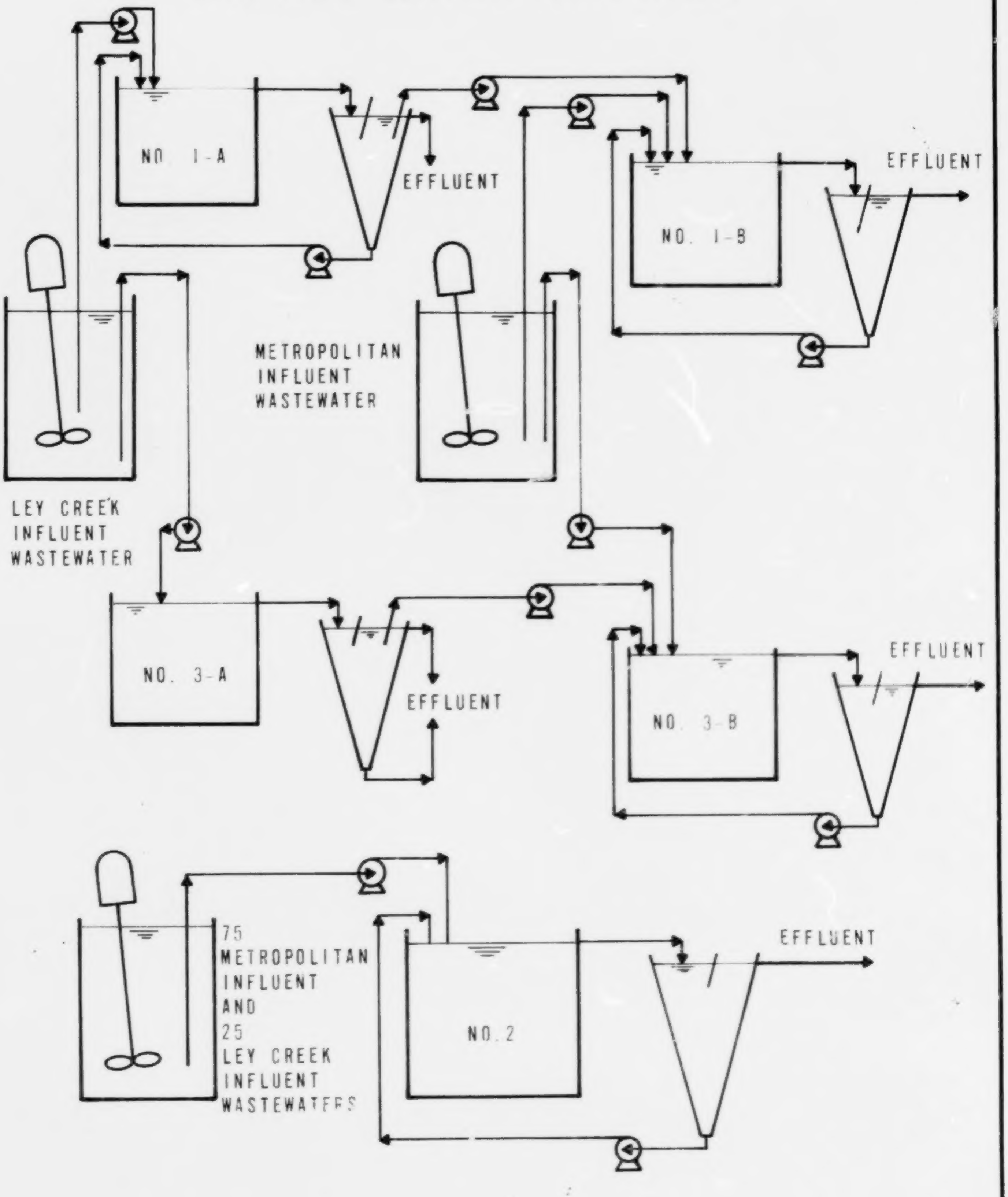
ONONDAGA COUNTY
BIOLOGICAL TREATABILITY STUDIES

CONVENTIONAL ACTIVATED SLUDGE SYSTEMS


NO. 1-A
EFFLUENT
EFFLUENT
NO. 1-B
METROPOLITAN
INFLUENT
WASTEWATER
LEY CREEK
INFLUENT
WASTEWATER
NO. 3-A
EFFLUENT
EFFLUENT
NO. 3-B
EFFLUENT
75
METROPOLITAN
INFLUENT
AND
25
LEY CREEK
INFLUENT
WASTEWATERS
NO. 2

B-4

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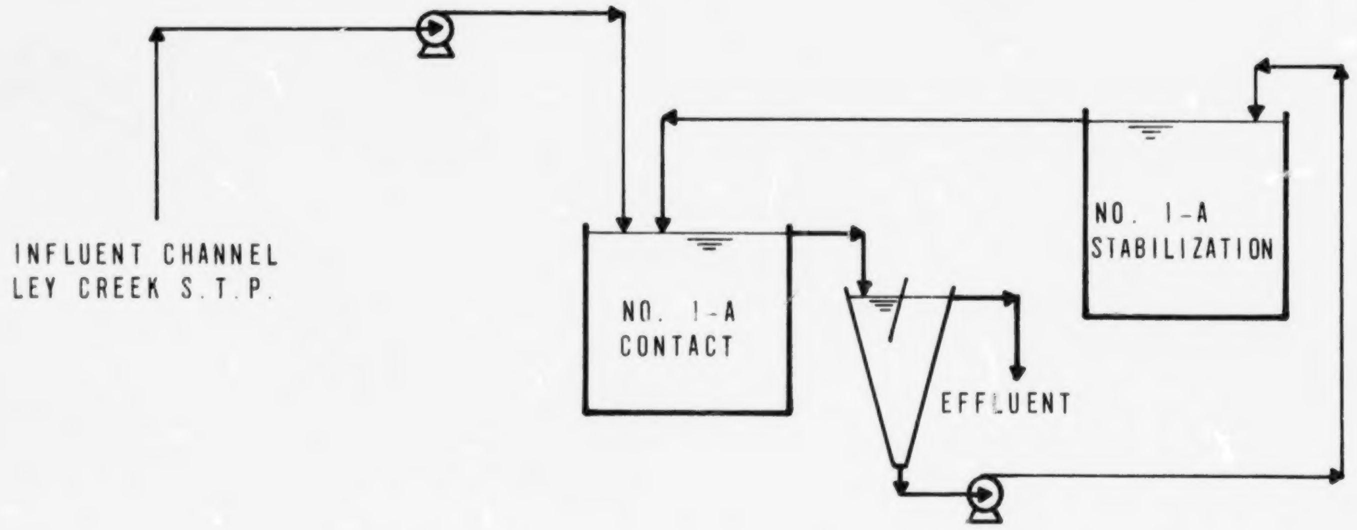
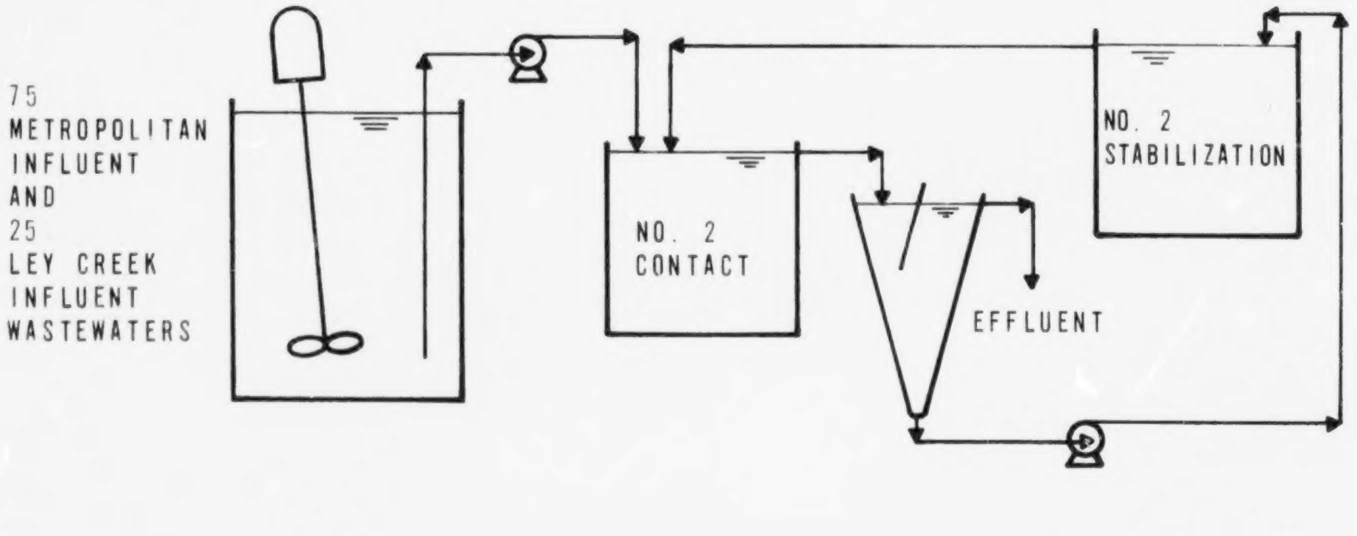
ONONDAGA COUNTY

BIOLOGICAL TREATABILITY STUDIES

CONTACT STABILIZATION SYSTEMS


INFLUENT CHANNEL
LEY CREEK S.T.P.
NO. 1-A
CONTACT
EFFLUENT
NO. 1-A
STABILIZATION


75
METROPOLITAN
INFLUENT
AND
25
LEY CREEK
INFLUENT
WASTEWATERS
NO. 2
CONTACT
EFFLUENT
NO. 2
STABILIZATION

B-5

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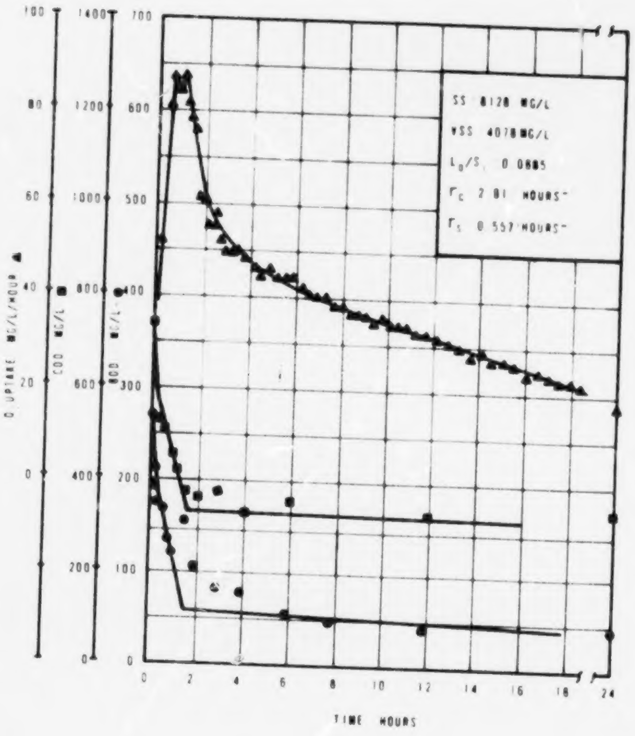
ONONDAGA COUNTY
SYSTEM 1-A
BATCH ACTIVATED SLUDGE DATA

TUBE NO 1



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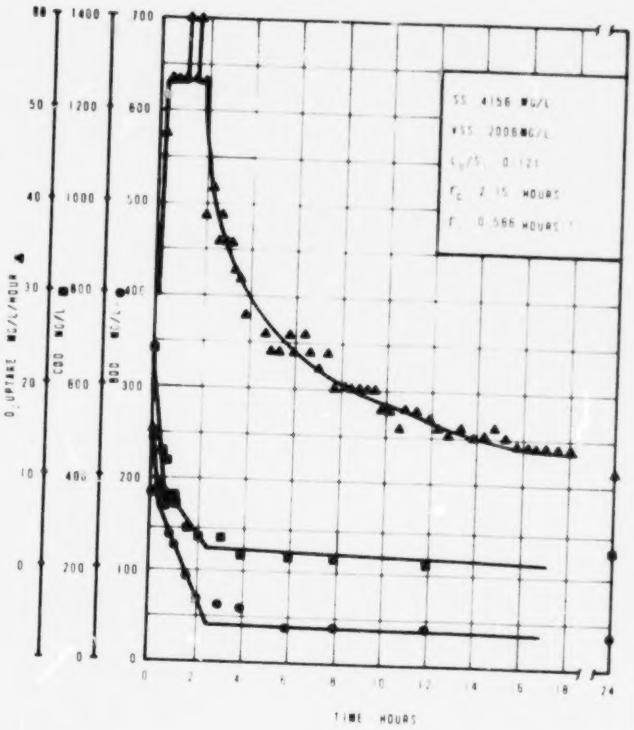

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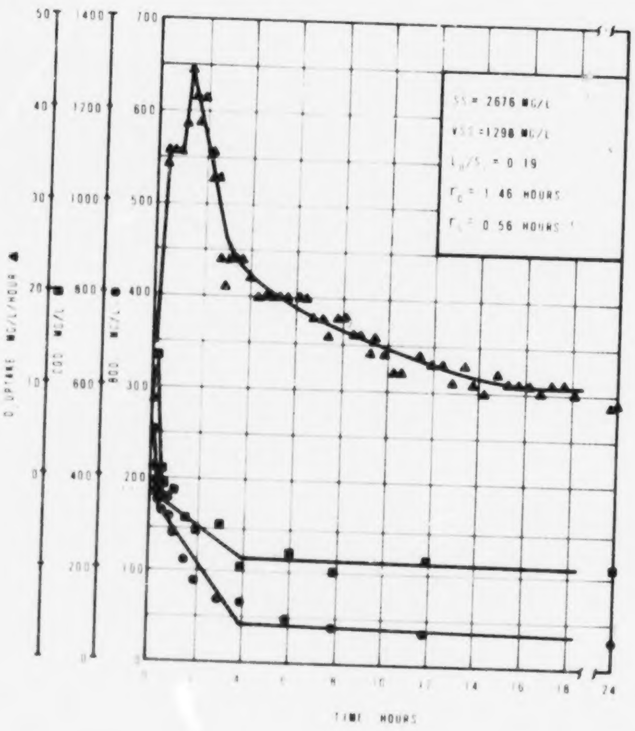

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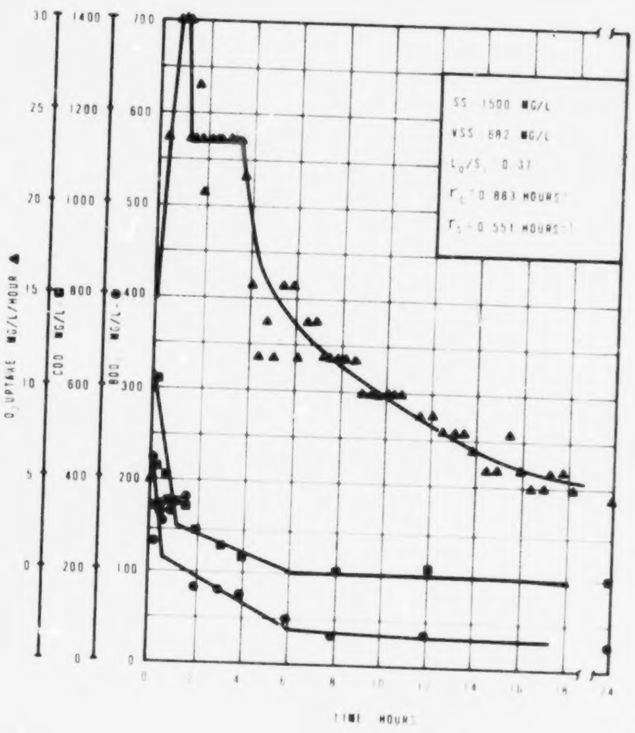

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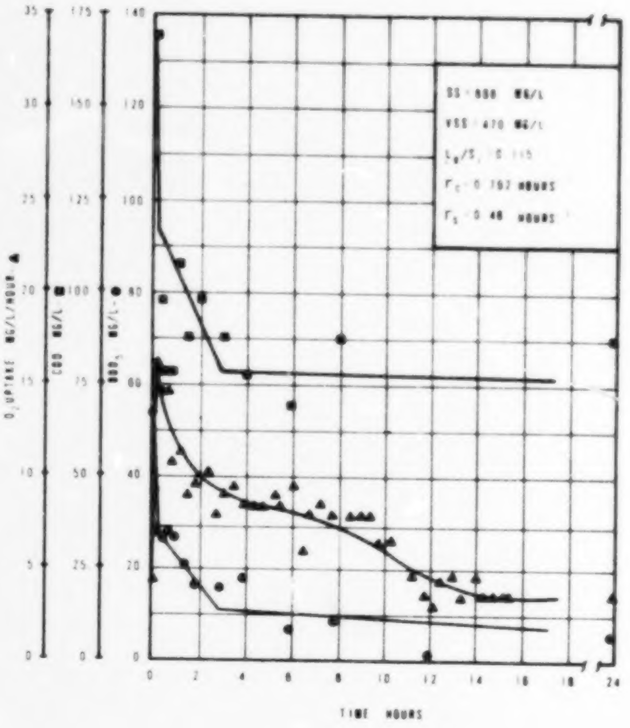
ENVIRONMENTAL SCIENTISTS AND ENGINEERS

ONONDAGA COUNTY
SYSTEM I-B
BATCH ACTIVATED SLUDGE DATA

TUBE NO 1



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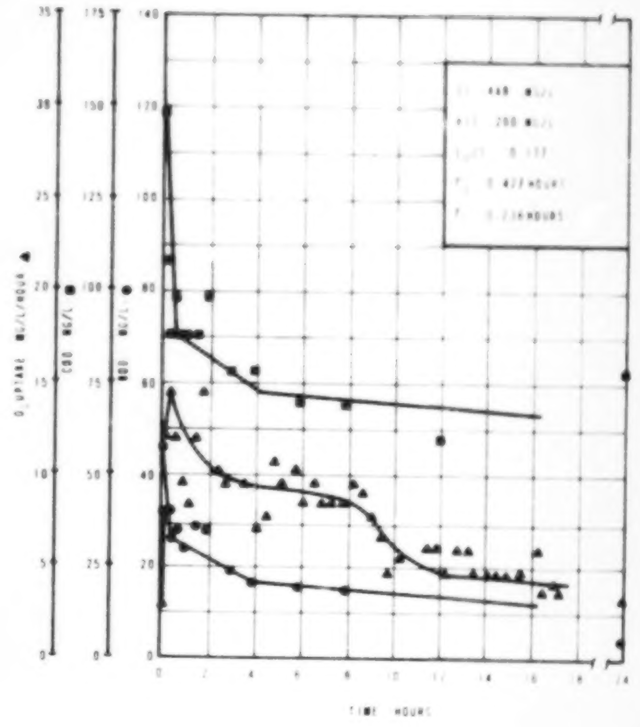

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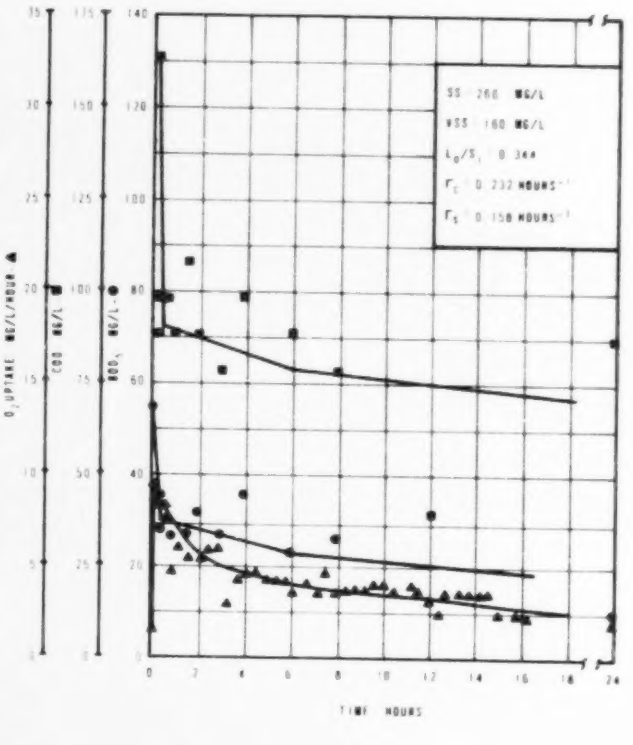

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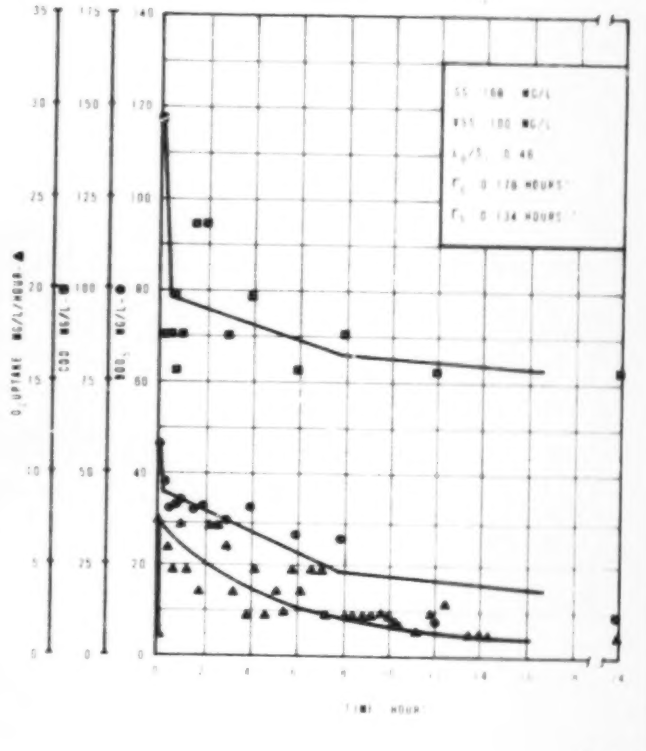
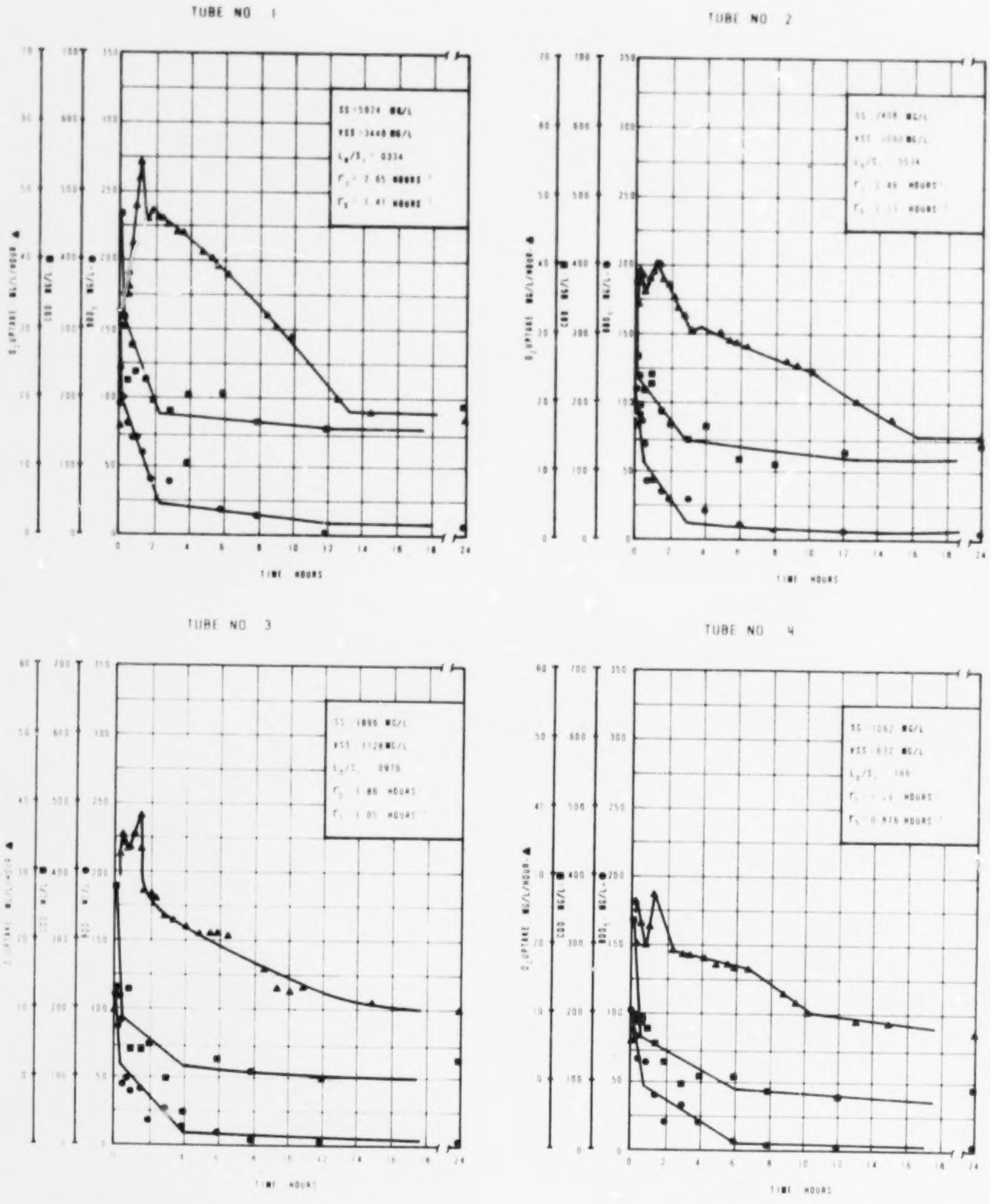


ONONDAGA COUNTY
SYSTEM 2
BATCH ACTIVATED SLUDGE DATA



B-8

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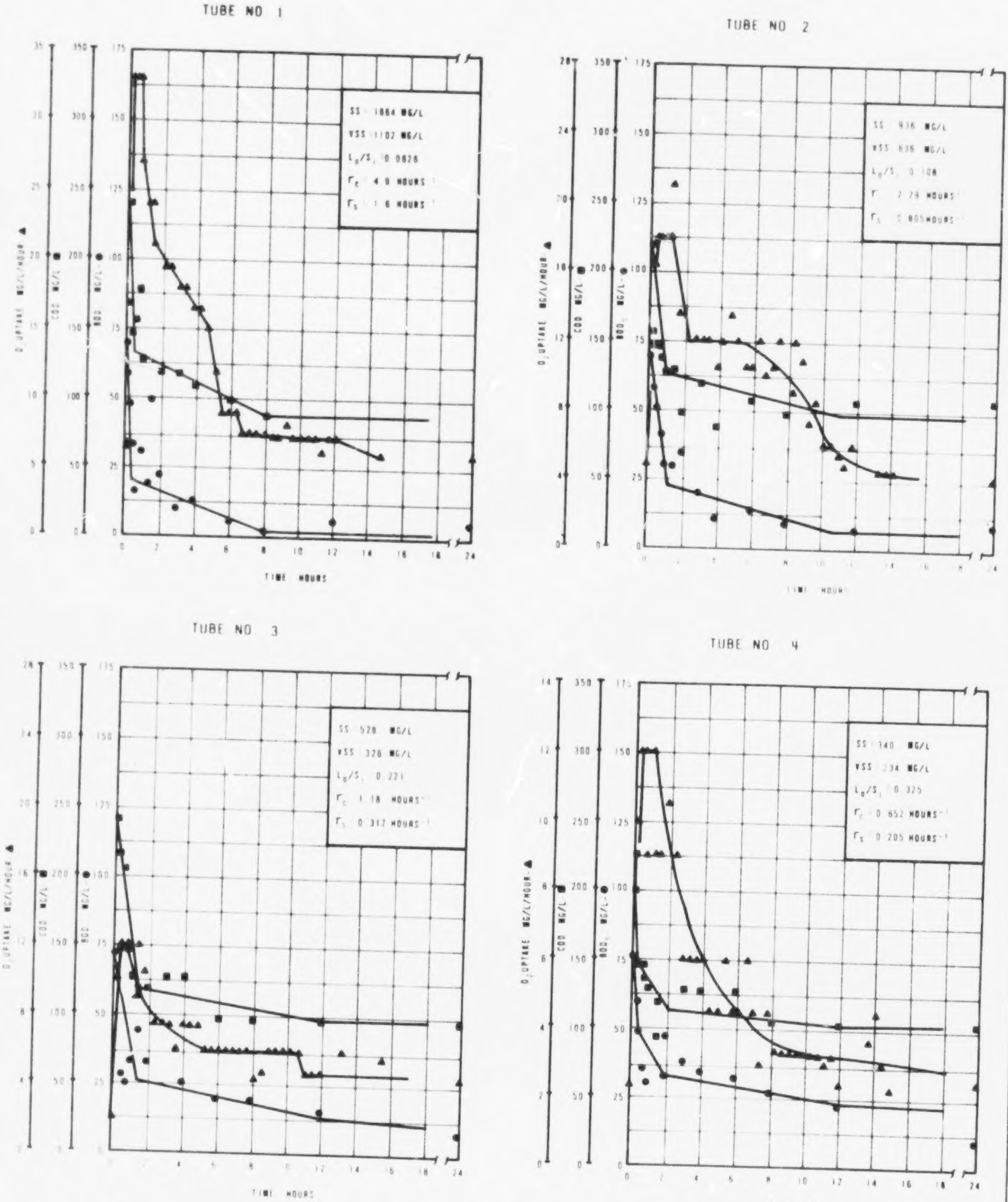
ONONDAGA COUNTY
SYSTEM 3-B
BATCH ACTIVATED SLUDGE DATA



B-9

ROY F. WESTON

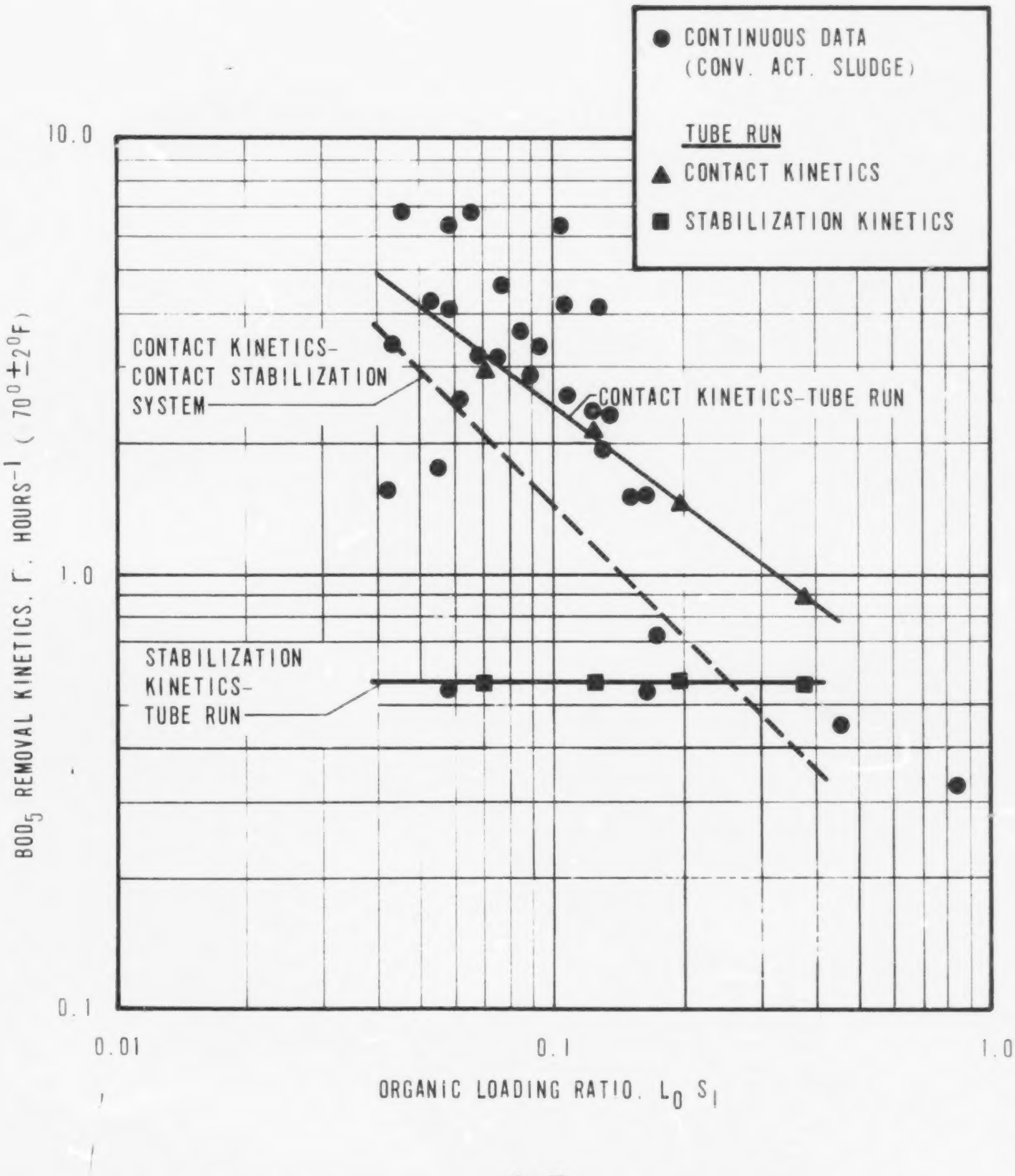
ENVIRONMENTAL SCIENTISTS AND ENGINEERS
LEWIS LANE • WEST CHESTER • PENNSYLVANIA • [illegible]

W.O 33605

ONONDAGA COUNTY

SYSTEM 1-A

BOD_5 REMOVAL KINETICS
VERSUS
ORGANIC LOADING RATIO



B-10

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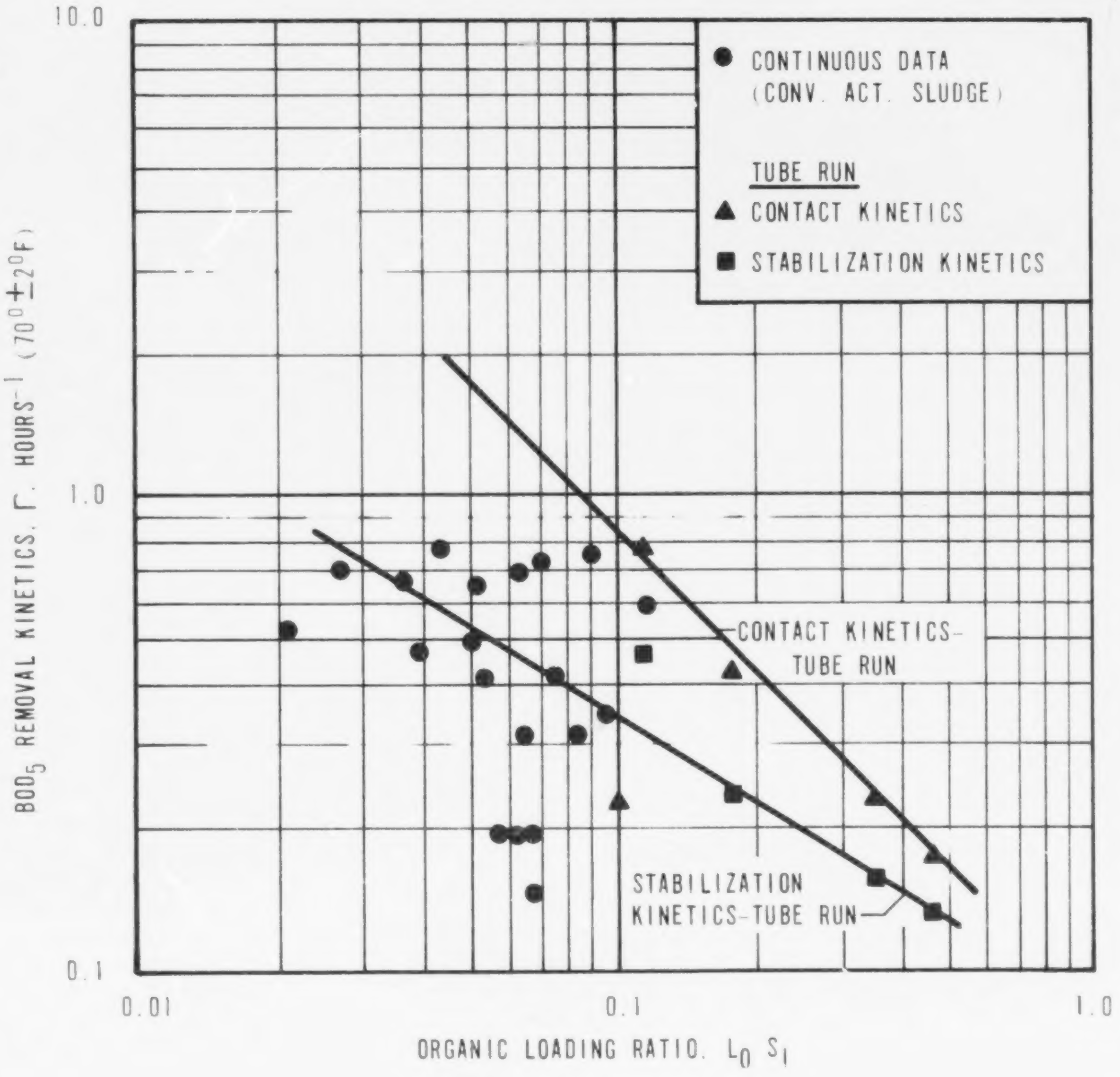
W.O.33605

ONONDAGA COUNTY

SYSTEM 1-B

BOD_5 REMOVAL KINETICS VERSUS ORGANIC LOADING RATIO



B-11

ROY F. WESTON
ENVIRONMENTAL SCIENTISTS AND ENGINEERS
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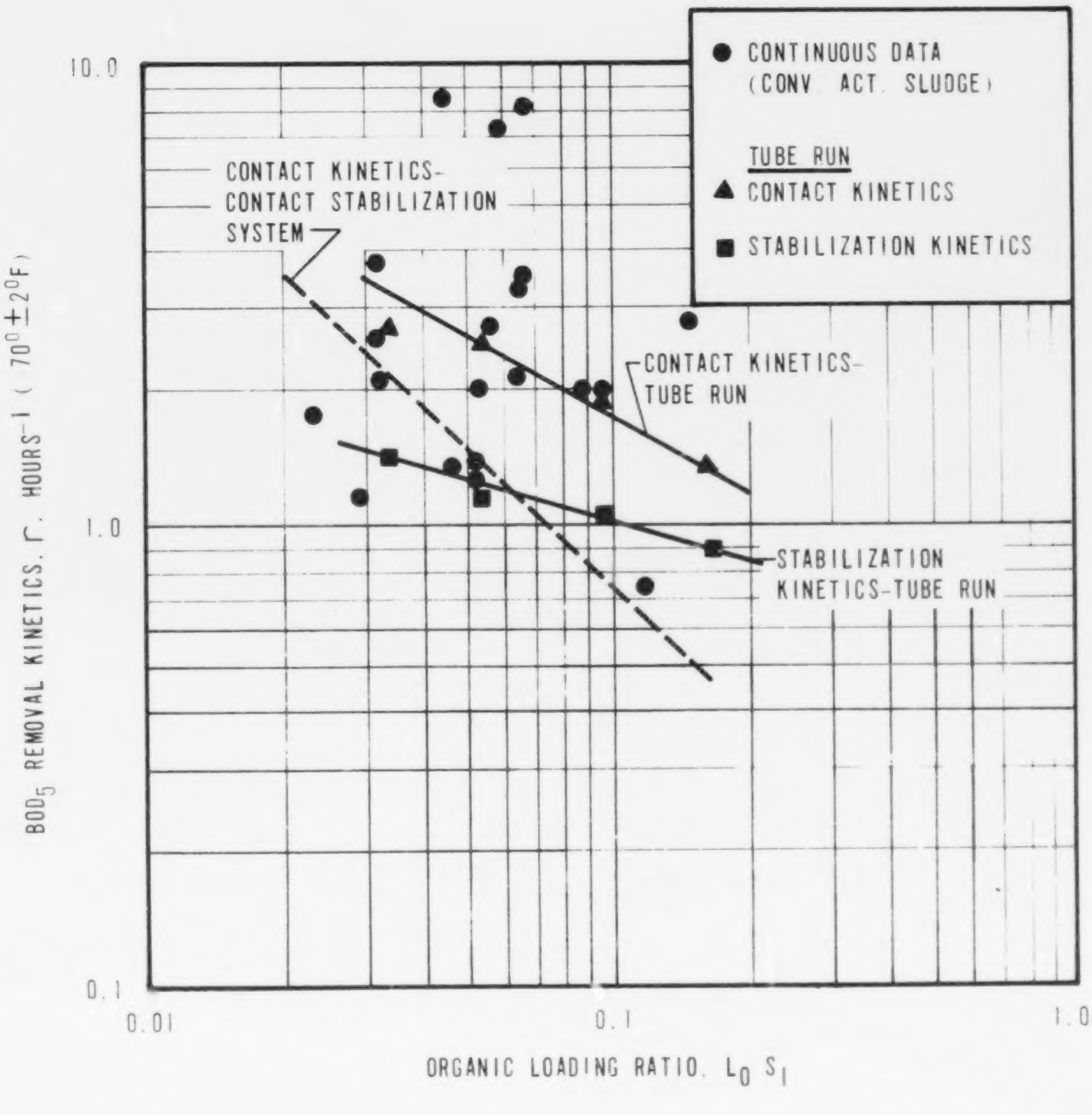
W.O.33605

ONONDAGA COUNTY

SYSTEM 2

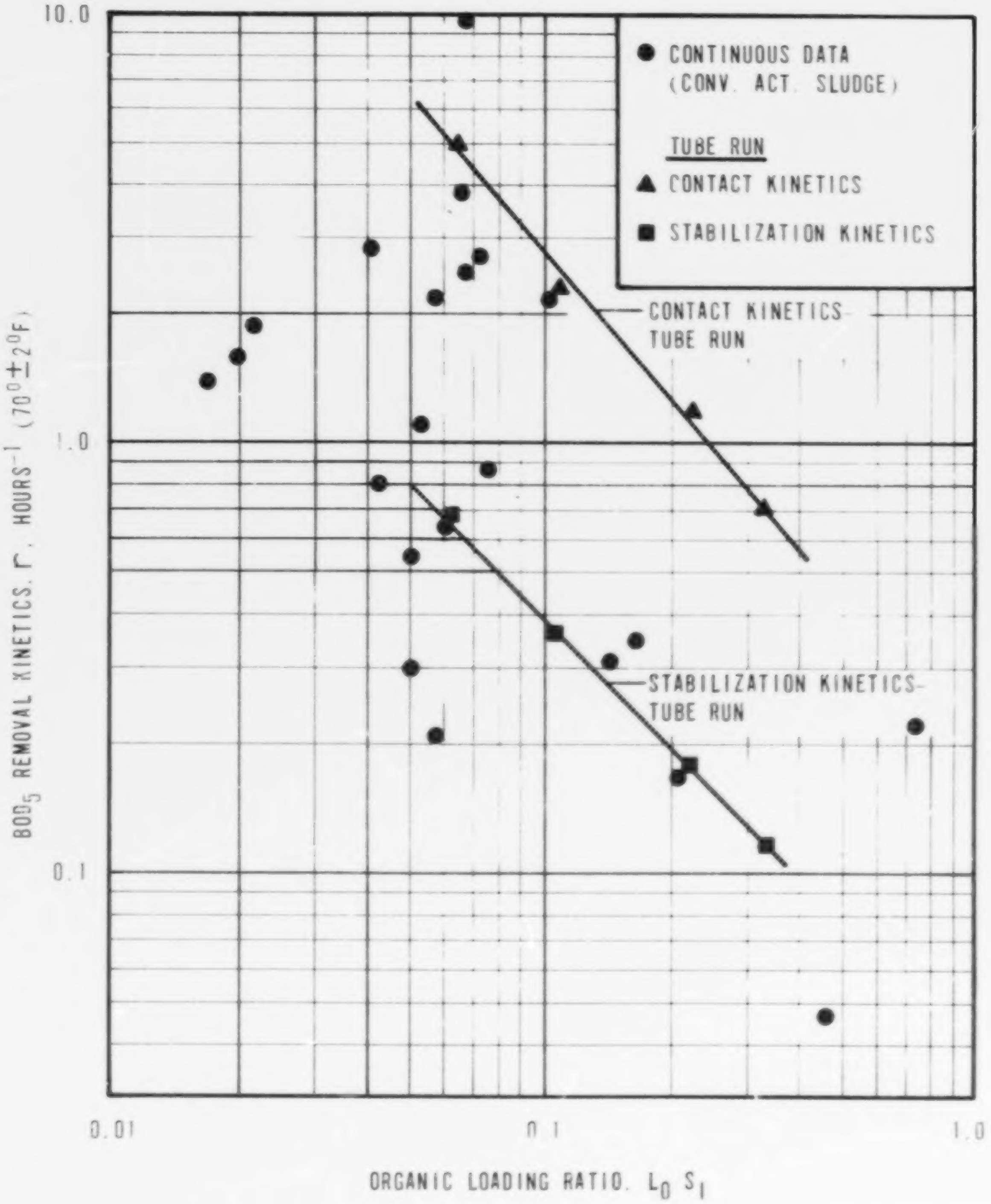
BOD_5 REMOVAL KINETICS
VERSUS
ORGANIC LOADING RATIO



ONONDAGA COUNTY

SYSTEM 3-B

BOD_5 REMOVAL KINETICS VERSUS ORGANIC LOADING RATIO



B-13

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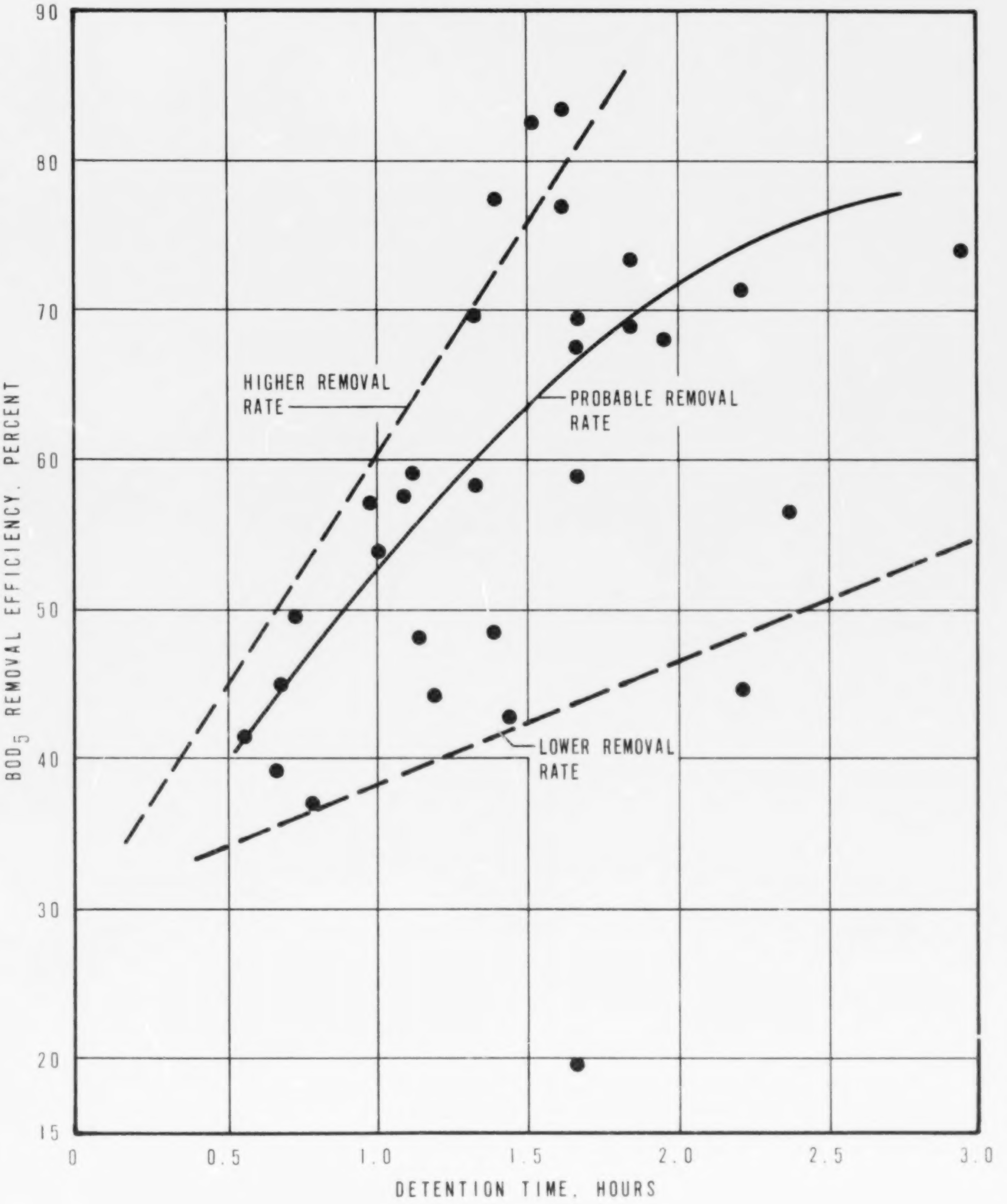
ONONDAGA COUNTY
SYSTEM 3-A

BOD$_5$ REMOVAL EFFICIENCY VERSUS DETENTION TIME



B-14

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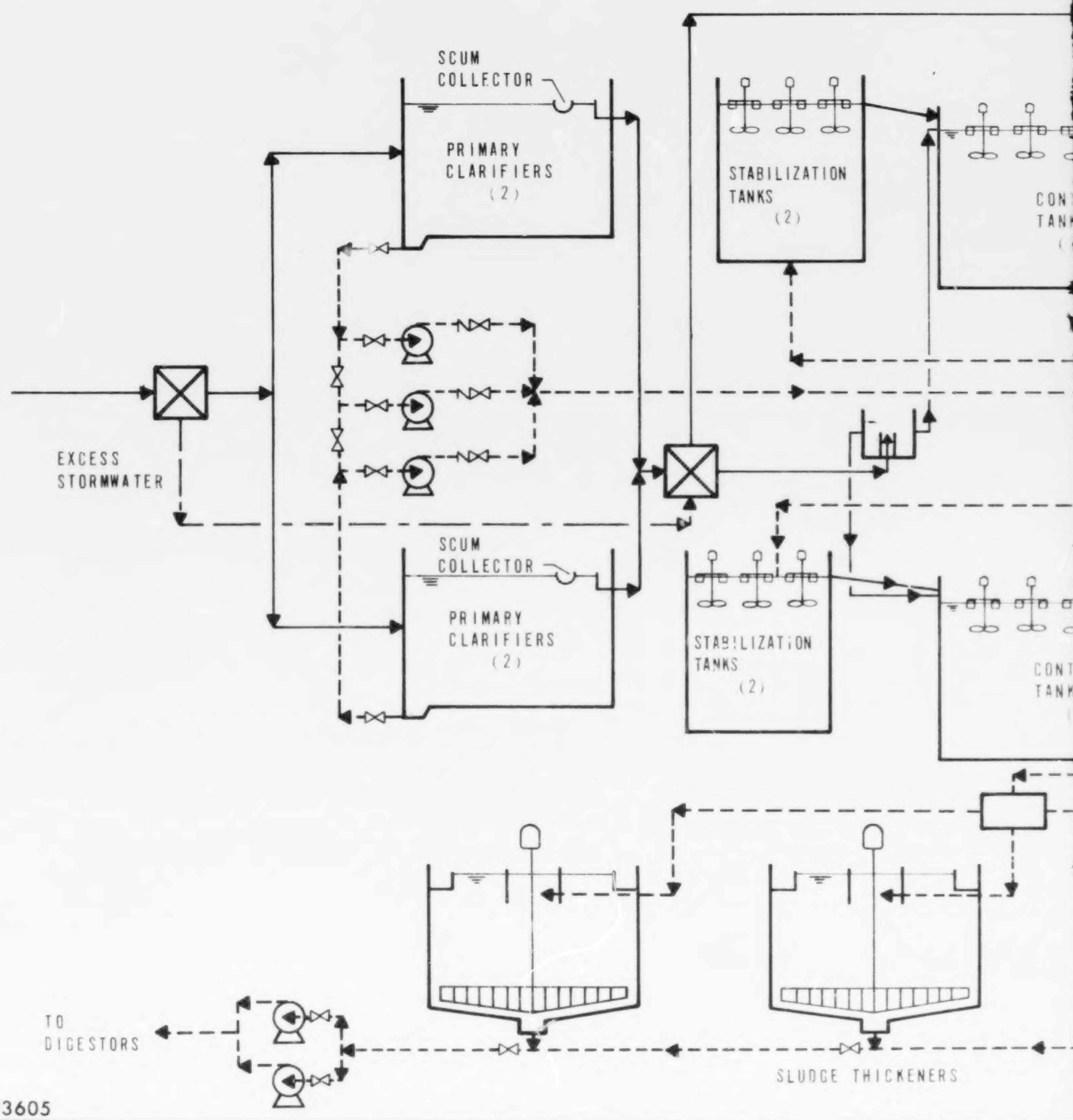
W.O.33605

A

ONONDAGA COUNTY
SYRACUSE, NEW YORK

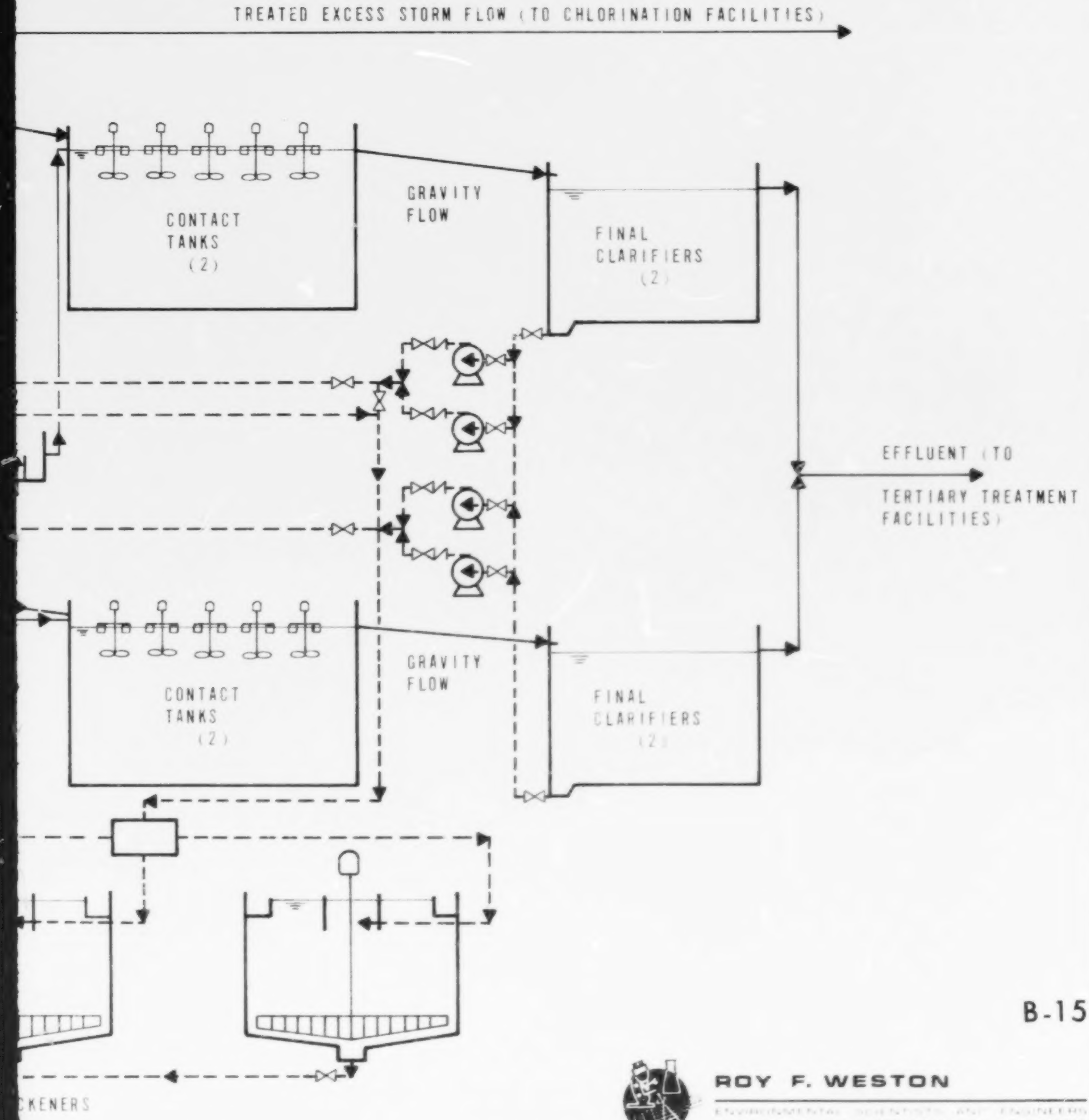
SIMPLIFIED FLOW DIAGRAM OF PROPO


SCUM COLLECTOR
PRIMARY CLARIFIERS (2)
STABILIZATION TANKS (2)
CONT TANK
EXCESS STORMWATER
SCUM COLLECTOR
PRIMARY CLARIFIERS (2)
STABILIZATION TANKS (2)
CONT TANK
TO DIGESTORS
SLUDGE THICKENERS

W.O.33605

B

GA COUNTY
NEW YORK
M OF PROPOSED FACILITIES


TREATED EXCESS STORM FLOW (TO CHLORINATION FACILITIES)
CONTACT TANKS (2)
GRAVITY FLOW
FINAL CLARIFIERS (2)
EFFLUENT (TO TERTIARY TREATMENT FACILITIES)
CONTACT TANKS (2)
GRAVITY FLOW
FINAL CLARIFIERS (2)
CKENERS

B-15

ROY F. WESTON

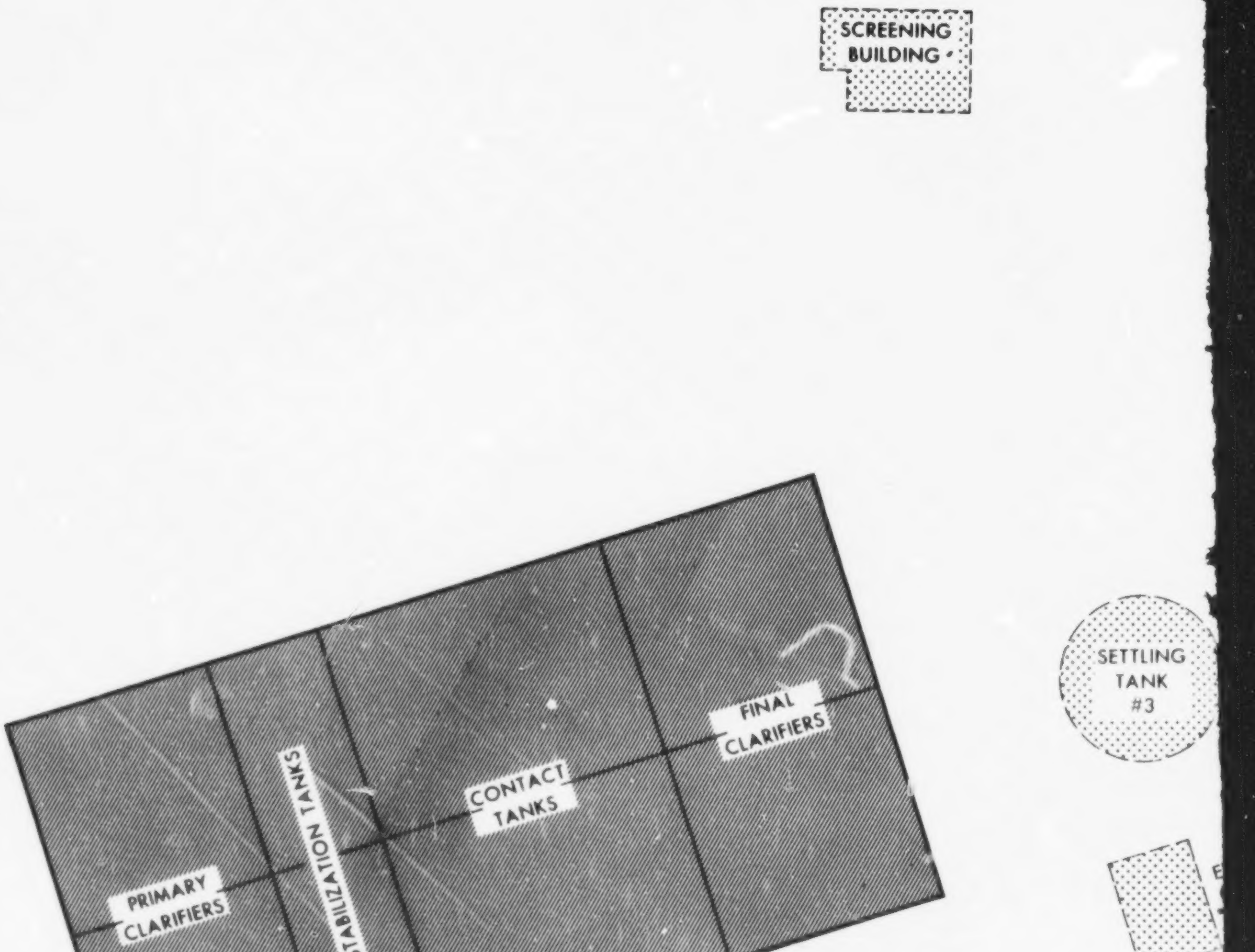
ENVIRONMENTAL SCIENTISTS AND ENGINEERS
LEWIS LANE • WEST CHESTER • PENNSYLVANIA • 19380

A

ONONDAGA

SYRACUSE, NE

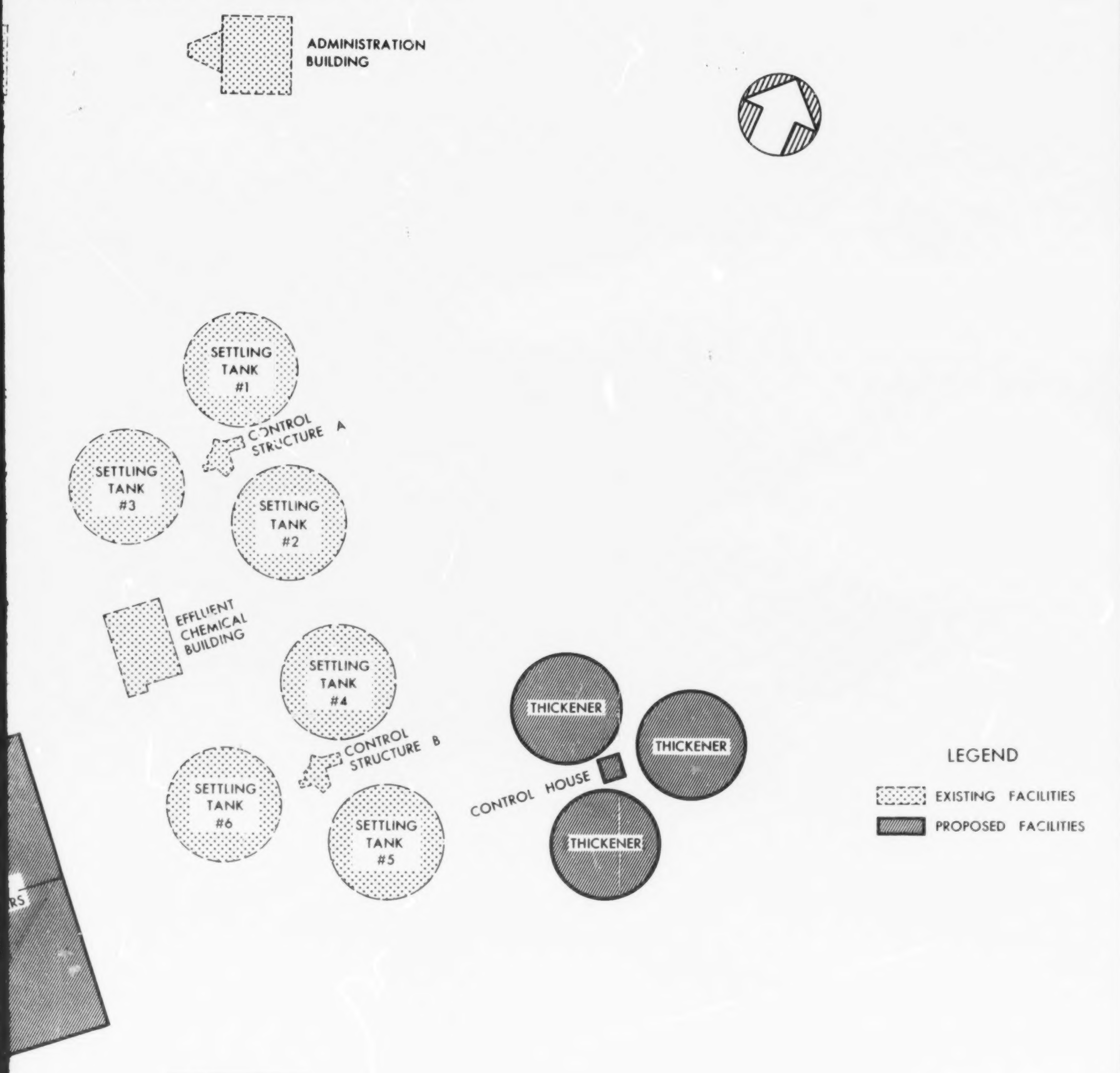
TENTATIVE PLOT PLAN OF PROPOSE


SCREENING BUILDING
SETTLING TANK #3
PRIMARY CLARIFIERS
STABILIZATION TANKS
CONTACT TANKS
FINAL CLARIFIERS
PRIMARY CLARIFIERS
STABILIZATION TANKS
CONTACT TANKS
FINAL CLARIFIERS
50

W.O.33605

DAGA COUNTY
USE, NEW YORK
OF PROPOSED TREATMENT FACILITIES

B


ADMINISTRATION BUILDING
SETTLING TANK #1
CONTROL STRUCTURE A
SETTLING TANK #3
SETTLING TANK #2
EFFLUENT CHEMICAL BUILDING
SETTLING TANK #4
CONTROL STRUCTURE B
SETTLING TANK #6
SETTLING TANK #5
THICKENER
THICKENER
THICKENER
CONTROL HOUSE
RS
LEGEND
EXISTING FACILITIES
PROPOSED FACILITIES
50 25 0 50 100
SCALE IN FEET

B-16

ROY F. WESTON
ENVIRONMENTAL SCIENTISTS AND ENGINEERS
LEWIS LANE • WEST CHESTER • PENNSYLVANIA • 19380

APPENDIX C

The following rules and regulations are hereby promulgated by the Commissioner of Public Works pursuant to sections 11.53g and 11.53j of Article 11A of the Onondaga County Administrative Code

Rules & Regulations Governing the Use of Public Sewers

Section 1. No person shall discharge or cause to be discharged any storm water, surface water, ground water, roof runoff, subsurface drainage, cooling water or unpolluted industrial process waters to any sanitary sewer.

Section 2. Storm water and all other unpolluted drainage shall be discharged to such sewers as are specifically designated as combined sewers or storm sewers, or to a natural outlet approved by the Commissioner. Industrial cooling water or unpolluted process waters may be discharged, upon approval of the Commissioner, to a storm sewer, combined sewer or natural outlet.

Section 3. Except as hereinafter provided, no person shall discharge or cause to be discharged any of the following described waters or wastes to any public sewer:

a) Any liquid or vapor having a temperature higher than (150°F.).

b) Any water or waste which may contain more than (100) parts per million, by weight, of fat, oil, or grease.

c) Any gasoline, benzene, naphtha, fuel oil, or other flammable or explosive liquid, solid or gas.

d) Any garbage that has not been properly shredded.

e) Any ashes, cinders, sand, mud, straw, shavings, metal, glass, rags, feathers, tar, plastics, wood, paunch manure, or any other solid or viscous substance capable of causing obstruction to the flow in sewers or other interference with the proper operation of the sewage works.

f) Any waters or wastes having a pH lower than (5.5) or higher than (9.0), or having any other corrosive property capable of causing damage or hazard to structures, equipment, and personnel of the sewage works.

g) Any waters or wastes containing a toxic or poisonous or radioactive substance in sufficient quantity to injure or interfere with any sewage treatment process, constitute a hazard to humans or animals, or create any hazard in the receiving waters of the sewage treatment plant.

h) Any waters or wastes containing suspended solids of such character and quantity that unusual attention or expense is required to handle such materials at the sewage treatment plant.

i) Any noxious or malodorous gas or substance capable of creating a public nuisance.

Section 4. Grease, oil, and sand interceptors shall be provided when, in the opinion of the Commissioner, they are necessary for the proper handling of liquid wastes containing grease in excessive amounts, or any flammable wastes, sand, and other harmful ingredients; except that such interceptors shall not be required for private living quarters or dwelling units. All interceptors shall be of a type and capacity approved by the Commissioner, and shall be located as to be readily and easily accessible for cleaning and inspection.

Grease and oil interceptors shall be constructed of impervious materials capable of withstanding abrupt and extreme changes in temperature. They shall be of substantial construction, watertight, and equipped with easily removable covers which when bolted in place shall be gastight and watertight.

Section 5. Where installed, all grease, oil and sand interceptors shall be maintained by the owner, at his expense, in continuously efficient operation at all times.

Section 6. The admission into the public sewers of any waters or wastes having (a) a 5-day Biochemical Oxygen Demand greater than (300) parts per million by weight, or (b) containing more than (350) parts per million by weight of suspended solids, or (c) containing any quantity of substances having the characteristics described in Section 3, or (d) having an average daily flow greater than (2%) of the average daily sewage flow of the receiving treatment plant, shall be subject to the review and approval of the Commissioner. Where necessary in the opinion of the Commissioner, the owner shall provide, at his expense, such preliminary treatment as may be necessary to, (a) reduce the Biochemical Oxygen Demand to (300) parts per million and the suspended solids to (350) parts per million by weight, or (b) reduce objectionable characteristics or constituents to within the maximum limits provided for in Section 3, or (c) control the quantities and rates of discharge of such waters or wastes. Plans, specifications, and any other pertinent information relating to proposed preliminary treatment facilities shall be submitted for the approval of the Commissioner and no construction of such facilities shall be commenced until said approval is obtained in writing.

Section 7. Where preliminary treatment facilities are provided for any waters or wastes, they shall be maintained continuously in satisfactory and effective operation, by the owner at his expense.

Section 8. When required by the Commissioner, the owner of any property served by a building sewer carrying industrial wastes shall install a suitable control manhole in the building sewer to facilitate observation, sampling and measurement of the wastes. Such manhole, when required, shall be accessibly and safely located, and shall be constructed in accordance with plans approved by the Commissioner. The manhole shall be installed by the owner at his expense, and shall be maintained by him so as to be safe and accessible at all times.

Section 9. All measurements, tests, and analyses of the characteristics of waters and wastes to which reference is made in Sections 3 and 6 shall be determined in accordance with "Standard Methods for the Examination of Water and Wastewater", and shall be determined at the control manhole provided for in Section 8, or upon suitable samples taken at said control manhole. In the event that no special manhole has been required, the control manhole shall be considered to be the nearest downstream manhole in the public sewer to the point at which the building sewer is connected.

Section 10. No statement contained in this article shall be construed as preventing any special agreement or arrangement between the Commissioner and any industrial concern whereby an industrial waste of unusual strength or character may be accepted by the Commissioner for treatment, subject to payment therefor by the industrial concern.

Signed:	Approved:
Edwin M. Baylard Commissioner of Public Works	John H. Mulroy County Executive
February 28, 1968	February 28, 1968

APPENDIX D

Quality Standards for Class D Waters
New York State Department of Health

Items	Specifications
Floating solids, settleable solids, sludge deposits	None which are readily visible and attributable to sewage, industrial wastes or other wastes, or which deleteriously increase the amounts of these constituents in receiving waters after opportunity for reasonable dilution and mixture with the wastes discharged thereto.
pH	Range between 6.0 and 9.5
Dissolved Oxygen	Not less than 3.0 parts per million.
Toxic wastes, oil, deleterious substances, colored or other wastes, or heated liquids	None alone or in combination with other substances or wastes in sufficient amounts or at such temperatures as to prevent fish survival or impair the waters for agricultural purposes or any other best usage as determined for the specific waters which are assigned to this class.

Note: With reference to certain toxic substances as affecting fish life, the establishment of any single numerical standard for waters of New York State would be too restrictive. There are many waters, which because of poor buffering capacity and composition will require special study to determine safe concentrations of toxic substances. However, based on non-trout waters of approximately median alkalinity (80 p.p.m.) or above for the State, in which groups most of the waters near industrial areas in this State will fall, and without considering increased or decreased toxicity from possible combinations, the following may be considered as safe stream concentrations for certain substances to comply with the above standard for this type of water. Waters of lower alkalinity must be specially considered since the toxic effect of most pollutants will be greatly increased.

Ammonia or Ammonium Compounds	Not greater than 2.0 parts per million (NH_3) at pH of 8.0 or above.
Cyanide	Not greater than 0.1 parts per million (CN).
Ferro- or Ferricyanide	Not greater than 0.4 parts per million ($Fe(CN)_6$).
Copper	Not greater than 0.2 parts per million (Cu).
Zinc	Not greater than 0.3 parts per million (Zn).
Cadmium	Not greater than 0.3 parts per million (Cd)

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As the Nation's principal conservation agency, the Department of the Interior has basic responsibilities for water, fish, wildlife, mineral, land, park, and recreational resources. Indian and Territorial affairs are other major concerns of America's "Department of Natural Resources."

The Department works to assure the wisest choice in managing all our resources so each will make its full contribution to a better United States—now and in the future.

DAST-17